

This is a detailed black and white map of East Asia, Southeast Asia, and Oceania. The map shows the Korean Peninsula, Japan, China, and the Philippines. It includes numerous city names like Peking, Tientsin, Shanghai, Seoul, and Tokyo. Major bodies of water like the Pacific Ocean and Indian Ocean are labeled. The map also shows the borders of the USSR, Outer Mongolia, and Tibet. The equator is marked, and the map extends down to Australia and New Guinea.

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**NORMAN T. KIRK,  
Major General, U. S. Army,  
The Surgeon General.**

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**THE BULLETIN**  
OF THE  
**U. S. Army Medical Department**

ISSUED MONTHLY

WAR DEPARTMENT,  
OFFICE OF THE SURGEON GENERAL,  
WASHINGTON 25, D. C.

# **THE BULLETIN**

## **OF THE**

### **U. S. Army Medical Department**

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## Foreword

With the October 1943 issue, The Bulletin became a monthly periodical, instead of a quarterly, dedicated to keeping the personnel of the Medical Department informed on developments in war medicine. The new publication, known as The Bulletin of the U. S. Army Medical Department, absorbed the former quarterly dental and veterinary bulletins and will have material devoted to those fields in each issue.

The Bulletin is intended to be educational rather than directive in nature. It will contain the best information obtainable concerning military medical experience, observations, and procedure that may help to improve further the quality of professional services. The Bulletin will be a medium whereby experience gained in one theater of combat may be shared with those serving in other combat areas and with those in this country who are preparing for overseas duty. News items concerning military and scientific developments as well as original articles will be emphasized. The Bulletin, however, should not serve as a basis for the forwarding of requisitions for equipment or supplies referred to therein.

Obviously, some of the most interesting field experiences cannot be divulged in a periodical of this kind when our country is at war. The Bulletin will, however, publish that which can be safely told, drawing not only on current literature, but on many authoritative reports which reach The Surgeon General's Office from the field. Officers are invited to submit for publication reports of their field experiences that can profitably be shared with other officers.

The Medical Department has been commended for its work in caring for the sick and wounded in theaters of operations in war. The Bulletin will endeavor to stimulate such progress and to advance further the high standard of medical service in the Army of the United States.

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## FIRST AID



Top, left to right: (1) First aid by medical man of 2d Infantry Division in Germany, 9 March 1945. (2) In France, 24 July 1944. (3) By members of medical battalion, 79th Infantry Division, in France. (4) By a medic of 45th Division, prior to embarking for the invasion in southern France, 1944. (5) In the Hurtgen Forest, Germany, 18 November 1944. (6) Behind the front lines in Sicily, 9 August 1943. Signal Corps photographs.

## News and Comment

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### THE PREVALENCE OF INFLUENZA B

Since the middle of April 1945, small outbreaks of influenza have occurred in many parts of the United States and in Alaska, Canada, the Hawaiian Islands, Guam, Saipan, Jamaica, Panama Canal Zone, and Brazil. Most of the epidemics studied have shown evidence of influenza B infection. Influenza B virus has been isolated from cases at Buckley and Lowry Fields, Colorado; Sheppard Field, Texas; Camp Atterbury, Indiana; Camp Edwards, Massachusetts; and from both civilian and Army personnel in the Hawaiian Islands. The serologic tests also have been positive for influenza B in these same places, and in addition positive serologic results have been found in cases at the Stockton Ordnance Depot, California; Fort Lewis, Washington; Sioux Falls Army Air Base, South Dakota; Fort Monmouth, New Jersey; Alaska; Guam; and the Panama Canal Zone.

While the epidemics of influenza B have been widely scattered over a large territory, each individual outbreak has been small and remarkably isolated, in most instances showing little tendency to spread beyond the confines of a single camp or even part of a camp. At Camp Atterbury and Camp Edwards, the outbreaks of influenza occurred in the prisoner-of-war compounds and showed only slight evidence of spread to the remainder of the camps or to the surrounding communities, even though the prisoners worked throughout the camps and in industries in the neighboring districts. The occurrence of influenza B since the middle of April has not appreciably increased the over-all weekly rates of common respiratory diseases in the Army.

The symptoms of individual cases have been mild but characteristically those of influenza. The febrile course has lasted about two to four days and has been accompanied by chilliness, generalized aching, headache, and mild irritation of the nose and pharynx. Convalescence has been uneventful in the majority of cases, and the absence of postfebrile asthenia, usually associated with true influenza, is noteworthy. Few complications or secondary infections have occurred. In most instances, a slight increase in the number of bacterial pneumonias in the hospital has been noted, but most of these cases have shown the usual good responses to sulfonamide or penicillin therapy.

The occurrence of influenza during the last few months suggests somewhat the situation of 1918. In March 1918 in Army camps in the United States and in the armed forces of the United States in France, there began to be observed sharp

outbreaks of respiratory diseases generally diagnosed as influenza. The outbreaks in most camps were explosive in onset and affected a large proportion of the population of each camp attacked. These epidemics undoubtedly were more severe and there were more of them than have been reported this year. In addition, in 1918, the respiratory rates, after having shown a drop in February, showed an abrupt rise in March with a distinct peak in April. The rates then fell abruptly in May and June, but the level throughout the summer of 1918 remained somewhat elevated, and during this period apparently there continued to be small, smoldering epidemics of respiratory disease.

The ending of World War II will alter considerably the circumstances with respect to the mobilization of troops in the fall of 1945 from the conditions that existed in the fall of 1918. In 1918 an increasing mobilization of new recruits continued right up to November. The summer of 1918 was one with troop movements on an enormous scale. Camp after camp sent its trained organizations overseas and was refilled with new recruits. The situation in the summer and fall of 1918 resembled more closely the condition that existed in this war during the years 1942 and 1943.

On the basis of the cyclic fluctuations in the rates of respiratory infections, which show a high peak every four years with one due this year, together with the present prevalence of influenza B, the possibility of an epidemic this fall or winter must be seriously considered. If an epidemic does occur, its seriousness almost certainly would be influenced by the termination of the war, the wide use of sulfonamides and penicillin, as well as by the prophylactic use of influenza vaccine.

---

#### PIGMENTATION ASSOCIATED WITH USE OF ATABRINE

Yellow pigmentation of the skin and certain other tissues, due to the deposit therein of atabrine, is well known. The authors in reporting 10 cases describe apparently for the first time bluish pigmentary deposits of rather characteristic distribution involving the hard palate, finger and nail-beds, and one or more of the cartilaginous structures, such as the ears, nose, epiglottis, and tracheal rings, and brownish deposits in the conjunctivae, in addition to yellowish discoloration of the skin. None of their patients had symptoms referable to the pigmentation itself. The dark discoloration of the cartilages suggested a similarity to alkaptonuric ochronosis; however, none showed evidence of alkaptonuria or melanuria or any roentgenographically visible arthritic changes.

Abstract of paper by Maj. H. Saul Sugar, M.C., A.U.S., and Maj. William W. Waddell, M.C., A.U.S., submitted through The Surgeon General's Office to the Journal of the American Medical Association.

The pigmentary deposits associated with the prolonged use of atabrine in these cases were most characteristically seen as a gray-blue discoloration in the bony palate, ending with a sharp line at the transition to the soft palate. A gray-blue pigmentation of some or all the nail-beds is the next most obvious sign. This is manifested either as a transverse band at or near the middle of the nail or as a diffuse discoloration of the entire nail-bed. The next most obvious finding was yellow-brown pigmentation of the conjunctiva in the palpebral fissure area. This was present in every case. The conjunctival pigment extended in patches of varying size from the nasal and temporal sides of the cornea and involved the corneal limbus nasally and temporally, less frequently below, and in two cases in the present series involved the plica semilunaris and caruncle. Based on the biopsy findings in one case, the pigment lies both in the basal layer of the epithelium and below it. The pigment patches as seen microscopically are composed of both yellow-brown, diffuse, finely granular pigment and more coarsely granular dark greenish-brown pigment. The darker pigment appears to take a linear or figure arrangement with rounded or scalloped margins.

Because of the difficulty experienced in distinguishing the conjunctival pigment from melanin clinically, a series of 40 patients who had been on atabrine therapy for varying periods of time without evidence of palate, nail-bed, or cartilage pigmentation were examined biomicroscopically and compared with another series of 40 patients who had never been on atabrine therapy. Among the 40 controls, 10 were dark-skinned and 30 had light skin. Conjunctival pigmentation indistinguishable clinically from the pigmentation found in the patients with palate, nail-bed, and cartilage pigmentation was present in the dark-skinned individuals. Of the 30 remaining individuals with light skin, 24 showed no pigment patches in the interpalpebral fissure area while 6 showed small patches of yellow pigment. Of the 40 patients who had been on atabrine for varying periods, only 3 showed no conjunctival pigmentation. Of the latter, one had discontinued atabrine one week previously; the second, five months previously; and the third, six months previously. This group consisted entirely of light-skinned individuals.

Comparison of these two groups indicates that, in light-skinned persons at least, the use of atabrine tends to cause a pigment deposition in the conjunctiva. In very dark-skinned individuals the distinction between pigmentation associated with atabrine and melanin pigmentation is clinically impossible.

The observations in this small series of cases with atabrine-associated pigmentation of the conjunctiva suggest that pigment may remain as long as nine months after discontinuing the use of atabrine, although it was absent, and presumably had disappeared, in other individuals five or six months after discontinuing the drug. The mode of production of the pigment associated with the use of atabrine and its nature are unknown.

This pigmentation requires no treatment and is important only in differential diagnosis. Among the conditions with which it may be confused are carotenemia, Addison's disease, icteric disease, picric acid poisoning, carbolochnosis, and alkaptonuric ochronosis. Except for the latter three conditions, only skin pigmentation could be cause for confusion since pigmentation of cartilage does not occur in them.

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#### TRANSMISSION OF MALARIA BY TRANSFUSION

With increasing numbers of troops in the United States returned from tropical areas overseas, who have or recently have had malaria, warning against the use of blood from such individuals for transfusion is renewed. The number of cases of malaria in Army personnel acquired by transfusion with infected blood is believed to be very small if any, and the careful selection of donors is undoubtedly responsible for this result.

Most of the stations collecting blood for processing have followed a policy that would not accept as a donor any individual with a history of malaria, or in some instances those with a history of residence in an endemic area. Others have accepted individuals whose last attack of malaria was twelve to fifteen years in the past. There may be occasions when such restrictions would not permit an adequate supply of blood for immediate transfusion. For practical purposes, blood is safe for transfusion when three years have elapsed since a last attack of *vivax* malaria was experienced and no suppressive drugs used in the interval. A period of one year of freedom from symptoms is sufficient for infections with *Plasmodium falciparum*. Individuals with a history of quartan malaria should never be accepted as donors.

Various workers have reported malaria infections from whole blood transfused after a five- to ten-day period of refrigeration. The same risk would probably apply to stored liquid plasma. There should be no risk of malaria infection from transfusion of plasma restored from desiccation.

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#### HOOKWORM INFECTION IN SOUTH PACIFIC AREA

According to a report by Major Averill A. Liebow, M.C., and Lieutenant Clair A. Hannum, Sn.C., hookworm infection in troops in the South Pacific Area appeared to be acquired largely during combat. The extent of infection among troops was in direct proportion to the length of time that they had been in combat and was increased among those who had occupied native villages and captured enemy bivouac areas. As an example, an infantry division which served in both the Guadalcanal and New Georgia campaigns had a much higher



incidence than another division which had battle experience only in the latter campaign. Infantry line troops who were exposed to intimate contact with the soil and battalion medical troops acting as stretcher bearers had a higher incidence of infection than headquarters, field artillery, service, and garrison soldiers. *Ancylostoma duodenale* was the more common species of hookworm encountered in the troops studied, indicating that the source of infection was soil contaminated by natives or by Japanese. The only practicable preventive measure in the field is to avoid unnecessary contact with the soil, especially in previously habitated areas. It has been the experience of the theater that, despite the fact that hookworm infection has been common, severe hookworm disease with anemia has been rare, probably because of light infections and generally adequate diet. Careful studies in the Pacific area indicated that, in patients with *A. duodenale*, biologic cure was accomplished in only 50 percent of the lightly infected cases by a single treatment with tetrachlorethylene.

#### MEDICAL DEPARTMENT CRITERIA FOR SEPARATION FROM SERVICE

The following table summarizes the criteria for separations, any one of which is basis for relief from active military service:

<i>Corps</i>	<i>ASR</i>	<i>Age</i>	<i>Length of Service</i>
M.C.	80	48	Prior to Pearl Harbor <sup>1</sup>
D.C.	80	48	Prior to Pearl Harbor
V.C.	80	42	Prior to 1941
Sn.C.	70	42	Prior to Pearl Harbor
M.A.C. <sup>2</sup>	70	42	Prior to Pearl Harbor
A.N.C. <sup>3</sup>	35	35	
M.D.D. <sup>3</sup>	40	40	
M.D.P.T. <sup>3</sup>	40	40	

Volunteers can remain on active duty if they have an efficiency index of 41 (M.C.'s and D.C.'s), 40 (V.C.'s, Sn.C.'s, M.A.C.'s), and 36 (A.N.C.'s, M.D.D.'s, and M.D.P.T.'s).

The Surgeon General announced that the foregoing criteria will be reduced not later than the end of the year, and provision will be made for length of service as a basis for separation for officers who came on active duty after Pearl Harbor.

#### EGGS OF SCHISTOSOMA JAPONICUM IN THE SKIN

The demonstration of eggs of *S. japonicum* in multiple skin lesions of a patient infected on Leyte has been reported by Major Harris M. Fishbon, M.C. Eggs were also present in the stools. As far as is known, this is the second such case. The report, with photographs of the skin lesions and microphotographs showing the eggs in sections of the skin, will be published elsewhere.

1. Except grades A, B, and C of the following: ophthalmologists and otorhinolaryngologists, orthopedic surgeons, and medical laboratory officers; all grades of neuropsychiatrists and plastic surgeons.

2. Does not apply to Regular Army enlisted men who have been commissioned.

3. In addition: married; dependents under 14.

### ELASTIC SPLINT FOR FOOT DROP

The importance of prevention and correction of foot drop in injuries of the lower extremity is self-evident. The elastic splint described has proved effective and comfortable, and it is made of materials available in all Army hospitals, Major Irvin Wolin, M.C., reports. The splint consists of molded plaster foot and calf pieces, lined with felt and joined by a wire-ladder splint, which acts as a hinge. The wire-ladder splint is bent to clear the heel and avoid pressure. Elastic cords extend on each side from the proximal end of the calf piece to the distal end of the foot piece. The splint is held in place on the extremity by three straps and buckles incorporated in the plaster.

In cases where the splint is used only for prevention of equinus the elastic cords are fastened with slight tension, just sufficient to hold the foot in neutral position. More tension is applied if equinus deformity has already developed. Inversion and eversion are controlled by increasing the pull on either the



FIGURE 1. Sketch of elastic foot-drop splint.

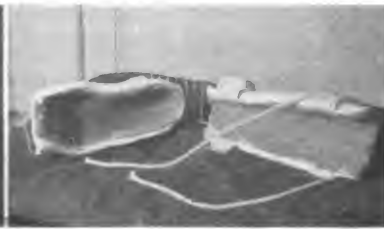


FIGURE 2. Interior of elastic foot-drop splint.



FIGURE 3. Splint applied after secondary closure of ankle wound.

lateral or medial cord. For marked equinovarus, the lateral cord is placed obliquely and extends from the region of the little toe to the medial aspect of the calf piece. If there is a simple varus deformity without equinus, the lateral elastic cord extends from the region of the calcaneocuboid joint to the medial aspect of the calf.

The splint exerts elastic corrective pull and at the same time allows exercises for the plantar flexors of the ankle. The strength of these muscles is maintained, since they must contract against the resistance of the elastic cords. Fibrosis does not develop as it does when rigid splinting is used. The constant elastic tension keeps the splint in contact with the foot. There is no pressure over the Achilles' tendon or its insertion. The splint is readily removable for bathing, dressings, and physical therapy. The flat surface of the wire-ladder piece helps to prevent rotation of the limb, and in cases where there is a marked tendency for external rotation at the hip a section of basswood splint or a small piece of wood is attached to increase the width of the hinge section.

### STUMP SOCK DRIER FOR THE AMPUTATION PATIENT

A definite need has arisen for a practical method of washing and drying stump socks, and Major M. M. Kissane, M.C., reports that the Amputation Center, Lawson General Hospital, has developed one which has been instituted as an occupational therapy project, each patient making one or more for himself. The drier is constructed of salvaged material, sheet metal or wood, duraluminum being preferred. The construction may vary depending on the gage of the metal available and to suit the individual patient. The size and arrangement of the air holes follow no specific pattern. Construction is accomplished from a set of patterns from the various sized stump socks. The drier affords adequate circulation of air through the sock and decreases the usual time required for drying by as much as half. Two small slits at the upper end of the drier allow the sock to be pinned in position so it will not wrinkle or sag during the drying process. Patients using this type of drier have found they can get along well with the prescribed issue of three pairs of stump socks, using clean socks daily.

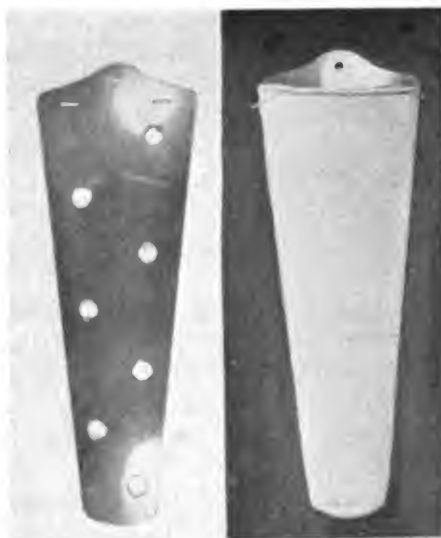
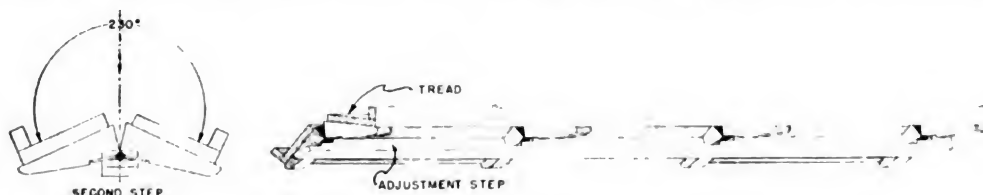


FIGURE 1

FIGURE 2

### ADJUSTABLE FOOT TREAD FOR CORRECTIVE EXERCISE

This tread, foot inversion, adjustable, has been a non-standard item included in the Therapeutic Gymnasium Equipment List for use in general, regional, and station hospitals in the zone of the interior. The Medical Department Technical



TREAD, FOOT INVERSION, ADJUSTABLE

Committee has recommended that the item not be standardized but that it be constructed locally. Its purpose is to assist in the correction of improper gait—to be used as an aid in physical reconditioning programs.

The illustrations indicate the essential features of con-

struction and method of adjustment. The wood parts should be of select, small-pore basswood, yellow poplar, noble fir, ponderosa pine, eastern white pine, western white pine, or Sitka spruce. Steel parts, hinges, and screws are commercial type items.

Specifications and drawings for local construction of this item at Army hospital installations may be obtained from the Medical Department Equipment Laboratory, Carlisle Barracks, Pa., by requesting "Medical Department Equipment Laboratory Drawing No. 1C-668, Tread, Foot Inversion, Adjustable."

### ORTHOPEDIC IMPROVISATIONS

The following improvisations developed by an evacuation hospital unit were forwarded to The Surgeon General's Office by the Office of the Chief Surgeon, European Theater.

1. *Boots*<sup>1</sup> made from salvaged shoes are being used to

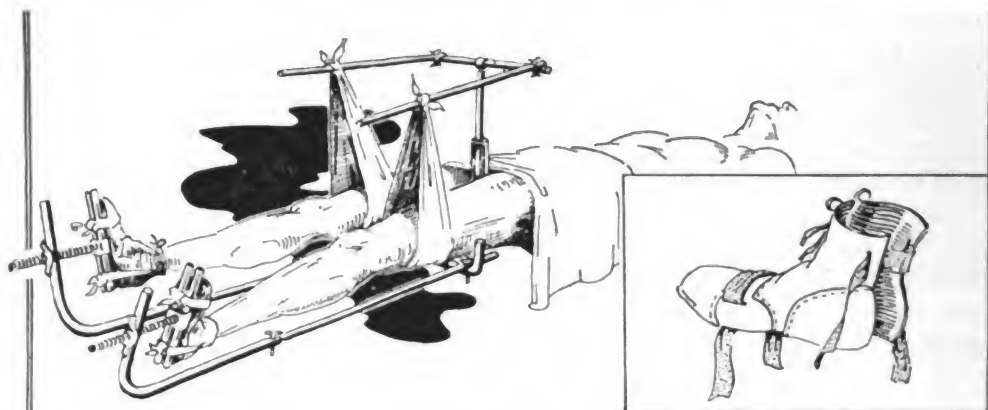


FIGURE 1

bind the foot to the foot piece when using the fracture table. The muslin hitch formerly used often slipped or became slack. This boot has decreased such imperfections as loss of traction and development of external rotation of the hip by improving control over the foot. The boot is made by slitting the back of a salvaged G.I. shoe, from which the sole has been removed, and cutting slots for the muslin bandage. The heel slots for the muslin bandage are placed sufficiently high that the bandage fitting over the top of the os calcis keeps the heel from slipping out. The feet are wrapped in sheet wadding before the boots are applied. (Figure 1)

2. A frame for the application of shoulder spicas was adapted from that used in the 35th Evacuation Hospital. The padded end of a Thomas leg splint is cut off and the splint bars are bent parallel and laid across the two suitcases in which the Zimmer fracture tables are carried. The patient

1. Devised by Technician Third Grade Milton C. Deuth.



FIGURE 2

lies on this frame (figure 2) and the spica is applied. When the plaster has set, the bars are pulled out. Greasing the bars lightly with petrolatum prior to use makes them easier to pull out.

3. A holder for lower extremities, made from scrap materials and adapted from a design in use in the United States, is useful when amputating the lower leg and occasionally in surgery of the foot. By elevating and holding the leg, it relieves the assistant of a tiring job. When the support is used, the surgeon should see that it does not press on the nerves and vessels of the popliteal space.

Its construction is not difficult (figure 3). The base is borrowed from the pelvic support (Item No. 3776000 which is T/E equipment for an evacuation hospital). A 4½-in. length of 1-inch pipe is heated and pounded square. An 8-in. length of stovepipe is cut 11 in. wide and molded into a trough, 6 in. across the top. Two strips of ¾-in. strap iron 6 in. long are hammered cold into a Y. Holes are punched in the stovepipe and are drilled through the strap iron, which is then riveted to the pipe. Holes are bored in the handle of the Y and in the squared pipe through which the two are joined by a wing nut and bolt. The height of the support is adjusted by putting a nail in the appropriate hole of the stand. The trough is covered with saddle-felt padding and protected by oilcloth.

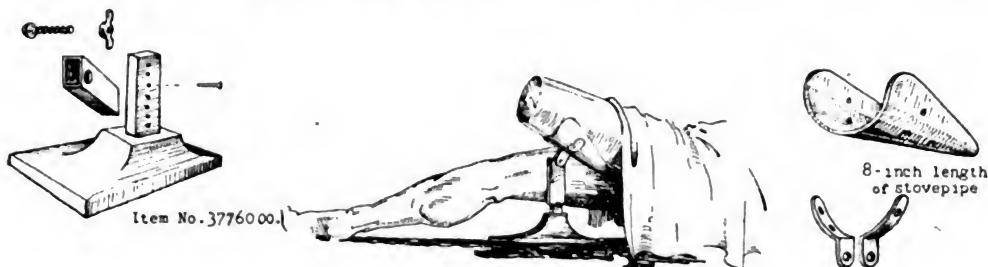


FIGURE 3

### COURSE FOR ORTHOPEDIC MECHANICS IN PLASTIC PROSTHESES

To prepare enlisted technicians, qualified as orthopedic mechanics (SSN 366), to fit, shape, and finish prostheses made of certain plastics, three classes of eight men each have been conducted at Chemold Co., Glendale, California, during the current year. Only orthopedic mechanics who had been on duty for a considerable period in orthopedic workshops of general hospitals designated as amputation centers were selected to attend. The course, which was a voluntary contribution of Chemold Company toward the rehabilitation of amputees, was conducted under the direct supervision of B. F. Schwartz, director of their Orthopedic Department. He was assisted by selected medical and technical authorities in and around Los Angeles. Trainees receive orientation in the anatomical problems involved in fitting prosthetics, the nature and handling of plastics, and were acquainted with the latest technical advances in artificial limbs.

### PROTECTIVE CANVAS BOOT

A soldier convalescing from a fractured fibula at the Station Hospital, Camp Wolters, Texas, designed a protective boot for covering the lower ends of walking iron casts. The



Canvas boot applied to cast.

boots are made from salvaged double-texture duck of the type used for car tops or seat covers. They are constructed on a double-flap pattern with a closed toe. The flaps are held in place by snap fasteners of the type used on automobile side curtains. The wearing of these boots by patients with lower leg casts prevents the casts from becoming weak

and crumbly when patients walk through mud or moist grass and weeds. Prior to using these boots, it was necessary to rebuild many casts of this type.

**Award to Veterinary Unit.**—A star to the Meritorious Service Unit Plaque has been awarded the Veterinary Food Inspection Detachment of the 1745th Service Command Unit, Fort Omaha, Nebraska. In the six months following the first presentation, the officers and men of this unit functioned with the same high professional efficiency and enthusiastic attention to duty described in the original notice of award by the Seventh Service Command, 18 December 1944.



### RECOMMENDATIONS OF COMMISSION OF PSYCHIATRISTS

At the request of the Neuropsychiatry Consultants Division of The Surgeon General's Office, the Field Service of the O.S.R.D. arranged for a commission of five civilian psychiatrists—Doctors Leo H. Bartemeier, Lawrence Kubie, Karl Menninger, John Romano, and John C. Whitehorn—to survey the neuropsychiatric policy and practice in the European Theater of Operations. This commission went to Europe on 16 April and returned on 8 July. They were high in praise of the medical care provided the American soldier.

Among their recommendations, the commission stressed the desirability of a plan which would permit the combat soldier a period of rest through rotation within the division or regiment. They recommended that replacements for combat soldiers should be given an opportunity to become identified and acquainted with the unit before actually going into combat. It was felt that the British method of officer selection was highly commendable and should be considered in the officer selection methods in the American Army. It was strongly recommended that psychotherapy given under or with the aid of sedation (narcosynthesis) should be limited to those psychiatrists who have had good clinical experience. They felt that greater emphasis and importance should be placed on occupational therapy, social participation, and organized group activities. They noted the inadequate number of psychiatrists at clearing stations and exhaustion centers. They came to the conclusion that the term "combat exhaustion" should be continued as a tentative and inclusive first-aid diagnosis and should be limited to the zone of operations and the zone of communications. They expressed the opinion that efforts might be made to further the utilization of psychiatry in the evaluation and treatment of the so-called psychosomatic cases and in the study of convalescence on the surgical wards, with the aim toward the prevention of neurotic reactions in relation to wounds, mutilations, and plastic surgery.

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### DIFFERENTIATION OF ORGANIC FROM HYSTERICAL ANESTHESIA\*

A method of differentiating organic from hysterical anesthesia has been described, using the Grass Electroencephalograph, Model II A. It is based on the galvanic skin response (GSR), which cannot be elicited if the sensory pathway of the galvanic skin reflex is interrupted by a complete anatomical or physiologic disruption of the peripheral nerve.

During the test the patient, with eyes closed, rests on a bed or in an easy chair. The bio-electric currents are obtained from a normal palm. Small solder electrodes standard for electroencephalography are used. Electrode jelly is applied

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\*Abstract of paper by Lieut. Frederick C. Redlich, M.C., submitted through The Surgeon General's Office to the American Journal of Psychiatry.

to the palm and the active electrode secured over it by adhesive tape. The neutral electrode is similarly fastened to the forearm over skin which has been scratched to permit contact with body fluids. Push-pull recording is used. It was advantageous to employ attenuations 7 to 10, to fix the low frequency filter on M, and the high frequency filter on 4 to filter out muscle action currents.

The graph is a straight line with occasional slight sways. Flashes of light, sudden noise, conversation, emotional excitement, and mental testing ordinarily evoke a deflection of the curve; hence the need for abolition of extraneous stimuli. When the area of organic anesthesia is stimulated by light touch or pinprick, there is no deflection of the graph. When, however, an area of normal sensation, of hypesthesia, or of hysterical anesthesia is so stimulated, a normal deflection occurs in one to three seconds (GSR). Movement of the part stimulated must be avoided.

In 10 patients (8 with complete lesions of sensory pathways of peripheral nerves and 2 with traumatic myelopathy) there was no GSR elicited, while in 10 patients with hysterical anesthesia the GSR was normal. It was suggested that this test may also prove of value in differentiating other sensory disorders, such as blindness and deafness.

#### PATIENT ORIENTATION

In receiving patients returned to the zone of the interior from overseas, the problem of their orientation to the home front is most important. Vital factors in this problem are the technique of approach to these patients, the information to be provided them, and the misinformation to be corrected. The patient returns primarily self-interested. He has sacrificed to serve, while some of his friends, disqualified for military service, have profited. His first thoughts are of home, parents, wife, or friends. He seldom realizes, prior to returning on his first convalescent furlough, that home has changed commensurate with the length of his absence.

Many patients while overseas have been misled by statements relative to policies operating in the zone of the interior. Furlough and leave, discharge from the service, specialty hospitals near their homes, these and other important subjects often are not accurately presented to the patient before his return to the homeland. Opportunities for employment, labor problems, and wages may have been explained to him in the wrong light. He knows little of the difficulties of rationing. He has heard much of spending and profiteering. He does not understand why some apparently physically qualified men escaped the Selective Service call. Other exaggerated impressions are in the minds of patients returned from overseas.

To lead the patient away from thoughts of himself, of his unit, of his overseas theater, and to help him realize that other



units fought on the other side of the world in equally difficult situations will broaden his ideas. He must be taught to realize that those in the zone of the interior accomplished much, too, in providing supplies for the United Nations. He must come to understand that his own relatives at home benefited as a result of war work, and so all was not loss to him if his family benefited. It should be pointed out that he, too, has gained from his experience in the Army. The training and instruction given may qualify him for employment in civil life. He has traveled to foreign lands. He has met interesting people. He has actually seen war. His horizons now are broader. To properly orient and to develop confidence and self-reliance in our overseas returning patients requires the full cooperation of the entire hospital staff—officers, enlisted men, and civilians.

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#### **SPECIAL TREATMENT FOR NEUROPSYCHIATRIC PATIENTS IN A CONVALESCENT HOSPITAL**

At Wakeman Convalescent Hospital, Camp Atterbury, Indiana, a special treatment building was developed for a certain few patients who required more intensive supervision and treatment before they could actively participate in the convalescent program. Facilities were provided for the administration of subshock insulin and individual psychotherapy under sedation; necessary nursing care was made available. After a week or two of individual treatment, the patients are referred to the full schedule of physical reconditioning, educational reconditioning orientation, and group psychotherapy. This facility has been particularly valuable for patients who were undernourished, underweight, markedly anxious or depressed, or fatigued.

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#### **CONTINUOUS SHELF FOR NEUROPSYCHIATRIC WARDS**

A continuous shelf which may be fixed to the wall of neuropsychiatric wards has been found to have advantages over bedside tables at the Schick General Hospital, Clinton, Iowa. The elimination of movable furniture from disturbed wards is desirable, and the advantages gained from a housekeeping viewpoint are important. The construction is indicated in the accompanying photograph.



### COMMISSIONS IN THE MEDICAL DEPARTMENT REGULAR ARMY

The Surgeon General invites attention of all Medical Department officers and former officers, other than those retired, of both male and female component corps to War Department Circular No. 243, dated 10 August 1945, subject: "Interest in Commissions in the Regular Army," an extract of which follows:

"a. Present indications are that a number of outstanding officers who have proved their capabilities in this emergency will be needed in the Regular Army peacetime establishment. Until appropriate legislation is enacted, the War Department cannot announce the conditions which will govern selection of these officers or the number required. However, it is desired that officers who have served in the emergency, whether or not they are still on active duty, be given the opportunity of indicating their interest in obtaining a Regular Army commission. An officer making such a statement of interest may go off active duty or remain in the service without prejudice to his chances of being tendered a commission when legislation is enacted. It is the intention of the War Department that the fact that an officer has not remained in active service will not affect the grade to be offered or the position he will occupy on the promotion list.

"b. The plan for selecting and integrating officers into the Regular Army officers corps, as well as the size and composition of that corps, will finally be determined by Congress. The War Department will recommend that those officers integrated into the Regular Army be of such age and physical condition as will permit them to serve for a reasonably long period before being retired. No officer will be appointed in a grade higher than that which he held in wartime.

"c. The content of this circular will be brought to the attention of every officer at the earliest opportunity."

Officers currently on active military duty and who are interested in being considered for commission in the Regular Army, following enactment of appropriate legislation, may submit a statement of interest to their immediate commanding officer as outlined in the above-mentioned circular. Officers and former officers, other than those retired, who have served since 7 December 1941 and who have been relieved from active military duty under honorable conditions may submit their statement of interest as outlined in above-mentioned circular direct to The Adjutant General, Washington 25, D. C. The submission of a statement of interest in a Regular Army commission in no way obligates an officer to apply for such a commission at any time. When the policies establishing the conditions and procedures for selection and integration of officers into the Regular Army, Medical Department, are finalized, The Surgeon General will make immediate announcement in *The Bulletin*.

### **PROFESSIONAL TRAINING OF REGULAR ARMY MEDICAL CORPS OFFICERS**

During the period of the emergency it has been necessary to place many Regular Army Medical Corps officers in administrative positions in the major commands. This necessary procedure has caused a shortage of adequately professionally-trained Regular Army Medical Corps officers to take up the care of the sick and wounded, on the release of A.U.S. officers to civilian life.

That the Medical Department may be prepared to continue the excellent professional care of the sick and wounded, The Surgeon General has requested the Chief of Staff to authorize courses in professional training for Regular Army Medical Corps officers. This request has been approved, and a plan of training officers being relieved from administrative or other assignments where professional experience was not available has been placed in operation. This plan calls for the assignment of Regular Army Medical Corps officers to installations where courses in professional training, eventually leading to board certification, is to be carried out. This plan also calls for training, not only in military medical installations, but in outstanding civilian installations. Representatives of all major forces concerned have contributed to this plan, and officers assigned to any of these forces are eligible for the professional training.

The Surgeon General is insistent that the outstanding record of care of the sick and wounded in this war be maintained, and, for this reason, the far-reaching plan which he has prepared places foremost the professional qualifications and continued professional training of the Medical Corps officers. It is the sincere hope of The Surgeon General that all Medical Corps officers of the Army of the United States give earnest consideration to a career in the Regular Army, and he feels that, with the development of his present plan, outstanding opportunity for professional advancement will be afforded to all Medical Corps officers.

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### **ASSIGNMENT OF MEDICAL CORPS OFFICERS IN ZONE OF THE INTERIOR\***

At this time there are large numbers of patients in Army hospitals. As rapidly as possible physically qualified medical officers in the zone-of-the-interior medical installations who have not had overseas service are being replaced by returnees from overseas. ASF Circulars 151 and 278, 1945, require that the exchange be accomplished at the earliest possible time.

Returnees from overseas will be required to serve in many medical installations throughout the country. Army hospitals are not located according to population centers. For example,

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\*From the Personnel Service of The Surgeon General's Office.

of the sixty-five general hospitals in the United States only eight are located in the northeastern part of the country. The need of the Army is a primary consideration in the assignment of medical officers. While assignment near home is desirable from the individual's viewpoint, it is rarely possible. Qualifications of medical officers are being continuously reviewed to ensure the full utilization of medical skills. It is believed that when medical officers are acquainted with these facts, they will willingly accept their new assignments as the most feasible method of caring for the large number of patients now in Army hospitals.

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#### ASSIGNMENT WITH THE VETERANS' ADMINISTRATION

The following paragraphs explain the present procedures in regard to the assignment of Medical Corps officers to duty with the Veterans' Administration or Navy:

The Secretary of War had previously directed that all Medical Corps officers declared surplus to the needs of the Army for any cause would be referred first to the Navy for screening and then to the Veterans' Administration if not selected by the Navy. Only in the event both agencies had indicated they could not utilize the abilities of the officer was he eligible for discharge.

Through continued efforts of The Surgeon General, these provisions have now been withdrawn and officers declared surplus to the Army requirements can be released directly to civil life. This will enable many Medical Corps officers to return to civilian occupations who would otherwise have been ordered to continued service with one of the agencies referred to above.

In the event officers are being considered for release from active duty and wish continued service with a Veterans' Administration facility, such desire can be expressed by direct communication with The Adjutant General. Furthermore, officers now on duty in Army installations who desire service with a Veterans' Administration facility may forward a request for such assignment to The Adjutant General through normal command channels. In the event the request is approved and the Director, Veterans' Administration, concurs, the transfer will be arranged.

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#### TEMPORARY PROMOTIONS

It is hoped that the instructions in the following letter will enable all first lieutenants of Medical, Dental, Veterinary, and Chaplain Corps to be promoted to the grade of captain when properly qualified after having served in grade the required number of months. This is not to be interpreted as an

automatic promotion, but one resulting from a recommendation after an officer's work has warranted such.

30 June 1945.

Commanding General,  
Army Service Forces,  
Washington 25, D. C.

1. Field reports received by the War Department indicate that the intent of paragraph 4d(3), AR 605-12, 17 August 1944, "Commissioned Officers---Temporary Promotions in the Army of the United States," is not fully understood.

2. It is the War Department's intent and desire that all first lieutenants of Medical Corps, Dental Corps, Veterinary Corps, and Chaplain Corps who are occupying positions established for an officer of these services in the grade of *captain*, *first lieutenant*, or *captain and first lieutenant* be promoted to the grade of captain, provided the officer concerned is qualified for and deserving of promotion and has served the required time in grade and position. The preceding is equally applicable to positions established by Tables of Organization and Equipment or from bulk allotment sources. In this connection, a command is authorized a number of captain positions equal to the authorized captain strength plus the number of positions established in the grade of first lieutenant for officers of the Medical, Dental, Veterinary, and Chaplain Corps.

BY ORDER OF THE SECRETARY OF WAR

Adjutant General.

#### PROCUREMENT OF DENTAL OFFICERS BY ARMY

Authority has been granted to procure a limited number of qualified personnel for appointment as first lieutenant, Dental Corps, Army of the United States.

*Dentists eligible for appointment* include (1) graduate dentists who hold commissions as 2d lieutenants, Medical Administrative Corps, A.U.S., and who meet the prescribed physical standards; (2) qualified enlisted men (inducted) who meet the prescribed standards for appointment; and (3) graduates of approved schools of dentistry who were formerly A.S.T.P. trainees, who have received an honorable discharge from the A.S.T.P., and who are declared available by the War Manpower Commission.

Appointments will *not be considered* from the following: (a) Graduates who did not receive a portion of their education at Government expense under the A.S.T.P., except those under Army jurisdiction, will not be considered for appointment under any circumstances. (b) Graduates who formerly held commissions as 2d lieutenants M.A.C., A.U.S.; or graduates (A.S.T.P.) whose applications have been disapproved previously. (c) Graduates who have applied for commission in the Dental Corps, U. S. Naval Reserve, will not be processed for appointment in the Army, pending final action on their applications by the Navy Department.

*Application for commission.* 1. Graduates holding inactive M.A.C., A.U.S. commissions will be furnished application

forms and instructions by The Surgeon General's Office. Graduates in this category who fail to receive application forms within one week following graduation should write The Surgeon General for instructions.

2. Inducted dentists should make application through their commanding officer in accordance with the provisions of Army Regulations 605-10, dated 26 May 1944.

3. Graduates referred to under (3) above, who are interested in an appointment, should write direct to The Surgeon General, U. S. Army, 1818 H Street, NW., Washington 25, D. C., who will ascertain the availability of each candidate in this category from the Procurement and Assignment Service, War Manpower Commission. If the candidate is declared available by the Procurement and Assignment Service, War Manpower Commission, The Surgeon General will request the processing of his application on Form OPS-2, and the applicant will be contacted by the Officer Procurement District office nearest his home. Candidates will submit (a) evidence of honorable discharge from A.S.T.P. and (b) evidence of graduation from an approved dental school.

#### DENTAL SERVICE WITH A DIVISION

The following report shows the dental activities which actually occurred within a division during the Italian campaigns in 1944.

On 1 January 1944 the division was in North Africa, having just completed its movement overseas. As soon as possible, all unit dental officers were set up in their unit aid stations. A dental survey was accomplished, with the following results:

Class I ....None	Class III .... 127
Class ID.... 75	Class IV ....13,028
Class II ....505	

The Class ID cases, those requiring prosthetic treatment, were the immediate problem. To care for these cases, one officer and two dental technicians were placed on detached service at a station hospital unit in a nearby town. During January, seventy-two prosthetic cases were completed. The construction of these cases was accomplished entirely by division personnel.

About 1 February 1944 the division began its movement to Italy. The first location was a training area, where it remained from about 6 February to 3 March, 1944.

During this period the equipment and materials for a division dental laboratory were acquired. Frequent substitutions had to be made because of the nonavailability of certain items. For instance, a hand drill, mounted, was obtained from the division ordnance company, the shaft being cut down to fit the dental chuck. The dental lathe was not available for divisions at that time. During this period the unit dental officers accomplished routine dental care, working at their respective unit aid stations.

From 3 March 1944, when the division moved into the line, until 11 May 1944 they were in a static combat situation: "The Battle for Cassino." The dental laboratory was set up in a building, while plans were

made to construct a mobile dental laboratory. The body of a 2½-ton truck was procured, and the laboratory was constructed at the division ordnance company. On 30 April the division mobile dental laboratory was completed. The division was proud of the mobile laboratory, and we had the honor of having it inspected by the II Corps and Fifth Army Commanders. The mobile laboratory has proved to be the only answer to the division's prosthetic dentistry problem. One officer and two enlisted dental technicians have at all times been attached for duty at the laboratory. Through their efforts and the convenience of the mobile laboratory, the prosthetic dentistry problem has been cared for in a very satisfactory manner. The total number of cases constructed in the laboratory during the year 1944 is as follows:

New dentures .....	514	Dentures relined .....	7
Dentures reconstructed ..	64	Bridges fixed .....	17
Dentures repaired .....	220	Inlays .....	15
Dentures rebased .....	2		

This does not include the seventy-two cases constructed by division personnel while on duty at a station hospital during January 1944. These cases were credited to the station hospital report.

Routine dental treatment was accomplished by unit dental officers during this period, "The Battle for Cassino," at the unit aid stations. The policy, as regards the infantry regiments, was usually to have one dental officer at the unit service company and one at the regimental aid station. A very satisfactory amount of routine dental treatment was accomplished from 3 March to 11 May, 1944. This is possible when the front is static, as it was during this period. All the dental officers were able to set up their equipment, had adequate space and light, and patients were readily available.

On 11 May 1944 the division pushed off on the "Advance on Rome." The division remained in combat until about 10 June 1944, when it was relieved and went into a rest area.

The amount of routine dental treatment accomplished from 11 May to 9 June, 1944, naturally was less than that of the previous period. During an advance such as this, it is almost impossible for the dental officers to set up their equipment, except possibly at the service company, and then the number of patients available is definitely limited. The division remained in a rest area from 9 June to 6 July, 1944. During this period a satisfactory amount of routine dental treatment was again accomplished.

On 6 July the division resumed combat in "the Pursuit North of Rome," and remained in combat until about 1 August 1944. At that time the division went into a rest and training area, where it remained until about 20 September 1944. During the period 1 August to 20 September, 1944, an excellent amount of routine dental treatment was accomplished. The number of restorations during this period was about 3,200. A dental survey was also accomplished.

The division re-entered combat on 20 September 1944, "Battle of Approaches to Po Valley," and remained in combat until about 1 November 1944, at which time each unit, with the exception of the division artillery, was given a ten-day rest period.

During this combat period, 21 September to 1 November, 1944, there was very little routine dental work accomplished. The division was always in a precarious situation, having its right flank exposed. The weather, particularly the mud, was also a definite factor, making it difficult to set up tents; the buildings were scarce, and in all it was an extremely unpleasant situation. Dental treatment during this period hit a new low. In the regiments it was confined almost entirely to emergency treatment.



A fair amount of dental work was accomplished during the ten-day rest given each unit during November. However, it was too short a time really to accomplish anything. It takes time to set up and get into a routine. The men as well as the dental officers must have time in which to clean up and obtain a little relaxation after a campaign such as October provided. Then too, the unit is re-equipping the men, receiving replacements, and reorganizing. All in all, a ten-day so-called rest period has its limitations. After the completion of the ten-day rest given each unit, they again returned to the front line about 21 November 1944. The situation was a little different from what it had been since 11 May 1944. The front was static and the amount of routine dental treatment rendered was accordingly increased. The division remained in this position for the remainder of 1944.

The dental classification at the conclusion of 1944 was as follows:

Class I ....	38	Class III....	136
Class ID....	143	Class IV ....	11,543
Class II ....	1,612		

#### IMPROVISED HEAT EXCHANGER FOR DENTAL CLINIC

During the summer in the South, dental clinics may face the problem of holding down the temperature of the solutions in the dental film developing tank to 65° F. The experience of the clinic at the Army Ground and Service Forces Redistribution Station, Hot Springs National Park, Arkansas, as reported by Major Mark McKimmins, D.C., is a case in point. The city water system there often supplied the station with water at 80° F., and the cooling unit connected with the developing tank was unable to maintain the proper temperature. It was decided that if the incoming water was pre-cooled by using the cold water lost through the overflow drain



FIGURE 1. The "heat exchanger."

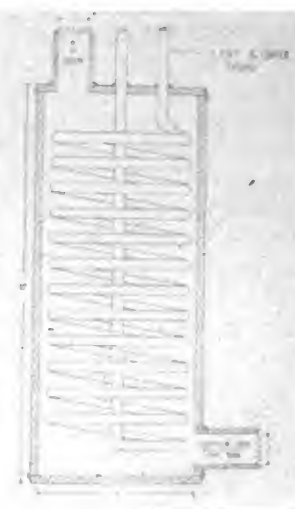


FIGURE 2. Sectional drawing of "heat exchanger."

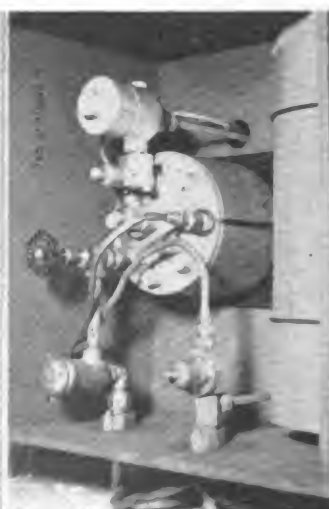


FIGURE 3. Top view of cooling unit showing connections made to use the "heat exchanger."



of the developing tank, its temperature would be low enough so the cooling unit would then be adequate.

Using scrap materials, a "heat exchanger" was built. The case was made from a 12-inch section of 5-inch pipe. Twelve feet of 5/16-inch copper tubing were wound on a wooden mandrel turned by hand on a lathe in the station machine shop. This coil was then welded in the position shown and the end plates, made of 3/16-inch steel, welded in place. One-inch pipe nipples were likewise welded into the positions shown. The manner of connecting the heat exchanger to the developing tank and to the cooling unit is shown in the illustrations.

In operation the heat exchanger gave most gratifying results. The incoming water was reduced from 80° to 70° F. before entering the cooling unit, and, as a consequence, the unit runs only 50 percent of the time. The operating life of the cooling unit will thus be extended. The advantage of maintaining the solutions at the correct temperature is obvious.

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#### HEALTH EDUCATION ON VENEREAL DISEASE

The Army has had an unprecedented opportunity to study at first hand the results of the mass use of compulsory health education directed at a single group of infections, the venereal diseases. The Army VD educational program has applied virtually all of the accepted techniques of health education, and its extent is such that during 1944 the amount of graphic educational material distributed will approach 15,000,000 pieces, and film audiences will total 10,000,000.

The aims of the program are to impart technical knowledge about the venereal diseases and to motivate the individual to use this information at the time it is needed for the avoidance of venereal disease. Certain principles have been found essential for the successful use of education as a tool of venereal disease control. Chief among these are (1) an integrated program, (2) highest possible quality and attractiveness of all educational materials, (3) abandonment of the pedagogic concept of health education and substitution of a new approach of "health advertising," (4) avoidance of overemphasis on sex, (5) technical accuracy of all materials.

In motivating the individual to use the knowledge he has been given, the following factors have been found effective as appeals: fear, intelligence, pride, and patriotism. Among the reasons for failure of motivation are (1) the nature of the sex urge itself, (2) "education for VD" afforded by sexy motion pictures, comic strips, pin-up girls, and the use of sex in certain

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From the Venereal Disease Control Division, Preventive Medicine Service, Surgeon General's Office.

Summary and conclusions of article by Captain Granville W. Larimore, M.C., A.U.S., and Lieut. Colonel Thomas H. Sternberg, M.C., A.U.S., entitled "Does Health Education Prevent Venereal Disease? The Army's Experience with 8,000,000 Men," read before the Southern Branch of the American Public Health Association in St. Louis, November 1944, and published in *American Journal of Public Health*, August 1945.

advertising, (3) "war psychology," (4) displacement of normal family and social relationships, (5) newer methods of treatment, (6) alcohol, and (7) state of morale. The strictly moral approach to the problem of avoiding venereal disease has been relatively ineffective in the Army.

In measuring the results of the program, the best single criterion is believed to be the extent of use of prophylaxis in the Army, which at present is at the rate of more than fifty million individual prophylactic items per month.

#### SUPPLEMENTAL LIST OF TRAINING AIDS IN TROPICAL DISEASES

The following recently prepared training aids supplement those listed in *The Bulletin*, August 1945, page 128, which also gave the sources from which the training aids may be obtained.

*Films.* Army-Navy Screen Magazine No. 52. It's Murder She Says (Snafu cartoon).

Malaria trailers for attaching to feature pictures (45 cartoons).

*Textbooks.* Medical Department Item No. B 291050. A Manual of Tropical Medicine (1st ed.), 1945.

##### *Graphic Training Aids.*

WD Graphic Training Aid 8-17. Personal Health. Portfolio (40 pages).

WD Graphic Training Aids 8-18 (A to C). Schistosomiasis (Snail Fever). Three posters.

WD Graphic Training Aids 8-19 (A to D). Scrub Typhus. Four posters.

##### *War Department Technical Builctins and Publications.*

TB MED 175. Prevention and Treatment of Adverse Effects of Heat, June 1945.

TB MED 181. Japanese B Encephalitis, July 1945.

TB MED 182. Data on Malaria Control, July 1945.

TB MED 183. Visceral Leishmaniasis—Kala-Azar, July 1945.

TB MED 184. Disinfestation Procedures, July 1945.

TB MED 194. The DDT Insecticides and Their Uses, 1945.

WD Circular No. 189, dated 25 June 1945, Malaria (information concerning effects of attacks on health).

#### GRAPHIC TRAINING AID ON PERSONAL HYGIENE

Reports on Pacific Ocean areas have indicated that a thorough discussion of procedures for the maintenance of personal hygiene is a primary training need. Therefore, the Training Division of The Surgeon General's Office has prepared a new graphic portfolio (GTA 8-17, Personal Health), consisting of forty charts, each 28 by 44 in., which present the essential features of personal health. The salient points covered are: personal cleanliness; foot care, including blisters and trench foot; proper eating; dental care; personal cleanliness in respect to the dissemination of dysentery and diarrhea; fly control; individual water discipline; cleaning of mess gear; conduct of the individual in limiting respiratory diseases; elimination of lice, fleas, and insects; and malaria prevention.

On the page preceding each chart are lecture notes to guide the instructor in his discussion of the various topics illustrated. While this graphic training aid is an A.G.O. publication and should be requisitioned through this channel, for convenience it is being made available for loan in most installations through Signal Corps film library facilities.

#### TRAINING FILMS

The Training Division of The Surgeon General's Office announces the introduction of the following training films and film bulletins which are available in the film libraries:

*Psychiatric Procedures in Combat Areas (FB 184).* This film shows how cases of combat exhaustion are handled in the division and army areas. Forty to 50 percent of cases go back to full duty as combat soldiers. (Running time: 45 minutes. 2 reels)

*Physiology of Anoxia (TF 8-1429).* (Produced by the Linde Air Products' Co.) The basis of inhalation therapy deals with the human body's need for oxygen and the means of supplying extra amounts in emergencies. It contains excellent animated diagrams of the corpuscular transmitting mechanisms and the various types of oxygen deficiencies. (Running time: 21 minutes)

*Amphibious Warfare—Ship to Shore (TF 8-1424.)* This Navy film adopted by the Army demonstrates the method of evacuation of casualties in amphibious operations and emphasizes the importance of the company aid man in maintaining morale and a sense of security for the first wave of troops. It shows the conception and execution of the medical plan and how the attack transport is converted into an ultramodern hospital ship. (Running time: 30 minutes)

The following films are in various stages of development. As they are completed, their availability will be announced in FM 21-7, "List of War Department Films, Film Strips, and Recognition Film Slides."

Project 10945. Technic of Continuous Caudal Analgesia. (Produced by Becton-Dickinson Co.)

MN 2477 b (Navy film number). Eye Surgery—Removal of Intra-ocular Foreign Bodies (Technicolor).

MN 3428 d (Navy film number). Combat Fatigue—Assignment Home.

MN 1511 f (Navy film number). Care of Sick and Injured—Chain of Asepsis.

MN 1511 l (Navy film number). Care of Sick and Injured—Enemy Bacteria.

#### Film Strips

FS 8-93	1945	Inspection of Meat and Meat Food Products. Part I.
FS 8-94	1945	Inspection of Meat and Meat Food Products. Part II.
FS 8-95	1945	Inspection of Meat and Meat Food Products. Part III.
FS 8-101	1945	Bandaging. Part I.
FS 8-102	1945	Bandaging. Part II.

### SHIGELLOSIS: EARLY DIAGNOSIS AND OBJECTIVE RESPONSE TO TREATMENT

In shigellosis or bacillary dysentery every means should be used to make the diagnosis as early as possible. The earliest positive diagnosis is often made by proctosigmoidoscopic examination. Stool cultures usually require two or more days and in many cases must be repeated to secure positive results. The use of the proctosigmoidoscope was found neither difficult nor painful and the results were most helpful. Among 87 cases observed in an Army hospital in New Guinea, 48 percent had negative stool cultures and might have had incorrect or much delayed diagnosis if this examination had not been performed.

#### Proctosigmoidoscopic Findings

The types of bowel lesions seen on proctoscopic examination depend chiefly on the stage of the disease. The salient features on which the diagnosis may be based are:

1. *Early phase.* Even when symptoms have been present only a few hours, the common features are found. Mucosal edema and diffuse hyperemia form the background. The mucosa may present a pink to red velvety surface. Punctate, flame-shaped, or ecchymotic hemorrhages are visible. Studied through the mucosal surface in this acute phase there may be the most characteristic lesions of all, minute miliary mucosal abscesses, creamy in color, and slightly elevated. These abscesses in untreated cases become topped by shallow ulcerations. When the patient receives chemotherapy, they may disappear quickly or be replaced by reddish granulation. Early, in the more acute cases, there may be diffuse superficial necrosis of the mucosa, with dissolution of the normally smooth surface and formation of a pseudomembrane. This may be wiped free, leaving a raw mucosal surface which may bleed freely. It is in the early acute phase of bacillary dysentery that the best opportunity for quick healing is offered. Up to a certain point in this infection, the bowel mucosa may endure toxic changes without sustaining poorly reversible damage. After such damage has occurred, however, the lesions must run their own course and their resolution is less quickly influenced by chemotherapy.

2. *Middle phase.* If first seen during the middle phase, the mucosa may not have much residual edema, and granulations may have developed at the sites of previous mucosal necrosis or abscesses. These granulations vary in number and size and are usually irregular in shape and separated by fairly normal areas of mucosa. They are usually a dusky red or purple and may or may not have in their centers superficial ulcers. Such ulcers may vary from 0.5 mm. to over 1.0 cm. in diameter, and may be round, oval, or serpiginous. Their bases may be distinctly

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Abstract of a paper by Major Lucian A. Smith, M.C., submitted through The Surgeon General's Office to the Journal of the American Medical Association.

gray and dirty. The proximal surfaces of the valves of Houston are favorite sites for granulations and ulcers. A patient with much rectal tenesmus may have most of his mucosal lesions in the distal 6 cm. of the bowel.

As these lesions heal, free pus and blood disappear from the lumen of the bowel, and soon afterward the mucosal edema lessens. The diffuseness of the hyperemia, the signs of necrosis, and the pseudomembrane are lost. The abscesses and sometimes the hemorrhages disappear. Granulation fills in the ulcerations and may assume a mulberrylike appearance. This dusky granulation usually becomes progressively lighter in color until a vague pinkish area remains. In many cases, however, reddish or purplish dry granulations persist for days after the patient could be considered cured symptomatically. Immediate diagnosis and prompt adequate chemotherapy are necessary to prevent the development of such slowly reversible lesions.

3. *Late phase.* In some cases of untreated acute bacillary dysentery, indolent ulcers which are more discrete are seen. Such ulcers usually have a dirty gray base, and the edges and interval mucosa may appear normal. Sometimes slowly healing ulcers leave superficial scarring as manifested by areas of pallor and loss of the normal vascular pattern. Little late thickening of the mucosa or the valve edges was seen.

#### Treatment

In studying the response of bacillary dysentery to various forms of treatment, it is necessary to take into consideration that in many instances the disease is mild and symptoms clear spontaneously. It should also be noted that demonstrable lesions may persist, though symptoms disappear. In this series the course was followed with the objective aid of proctosigmoidoscopy as well as the usual clinical observations. The general treatment was the same throughout. Fourteen were cases observed without chemotherapy, 20 patients received sulfaguanidine, 34 sulfadiazine, and 19 had sulfadiazine followed by a short course of sulfaguanidine. There were no untoward reactions to sulfadiazine, but 2 patients receiving sulfaguanidine had toxic symptoms.

Symptomatic relief was more rapid with all forms of chemotherapy than without any, and much more striking with sulfadiazine (22 out of 34 patients relieved on the first day) than with sulfaguanidine (no patients relieved on the first day). Symptomatic relief was not paralleled by objective healing of the lesions which required from three days to three weeks longer. The time required for healing as observed by sigmoidoscopy (as well as the hospital stay) averaged significantly less with sulfadiazine (average healing time 7.0 days) than with sulfaguanidine alone (average 10.2 days) or no chemotherapy (average 11.3 days). With sulfadiazine, stool cultures rapidly became negative in most cases, sometimes in

twenty-four to thirty-six hours. These observations indicate that sulfadiazine can be used safely and that it gives better results than sulfaguanidine.

The time for effective therapy in shigellosis occurs during the first twenty-four hours, when the initial toxic changes in the intestinal mucosa are most easily reversible. If effective treatment is postponed until stool cultures are reported, the ulcerative changes may require much extra time to heal and in some cases such lesions become resistant to treatment.

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#### QUALITY OF ARMY DRINKING WATER\*

The Army water quality control program has been effective in maintaining a high standard of quality of drinking water supplies during the past three years. The application of early-established policies has resulted in steady improvement throughout all service commands and in overseas theaters. In fixed installations in the zone of the interior, these policies have called for: (1) periodic sanitary surveys of all Army water supplies, and special investigations where conditions warranted such action; (2) a general requirement for chlorination of water supplies to the extent of maintaining 0.4 p.p.m. residual at all times in the active parts of the potable water distribution system, following an initial contact period of not less than thirty minutes; (3) proper training of operators of water supply facilities. These policies have been extended largely to overseas theaters, to both fixed and field installations, except that a requirement for an increased chlorine residual has been applied to field installations.

In the continental United States for the first three months of 1945, only 247 nonpotable samples resulted from analysis of 41,787 samples, a nonpotable average of only 0.6 percent. This may be compared with an average for the corresponding period of the previous year of 1.4 percent nonpotable, and with a nonpotable average of 2.11 percent for the fiscal year ending 30 June 1944. During this three-month period a low of 0.26 percent nonpotable was found in both the 5th and 8th Service Commands while the 3d Service Command followed closely with only 0.28 percent. The highest nonpotable results in a service command for this period are shown to be only 1.11 percent.

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#### WAC GENERAL HOSPITAL COMPANIES

The training of 7,088 WACs specifically recruited for WAC general hospital companies was completed in July at the 3d WAC Training Center, Fort Oglethorpe, Georgia. Of this number, 5,101 completed the medical and surgical technician's course, 1,304 completed the medical clerk's course, and 93 qualified for assignment without further technical training.

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\*From the Sanitary Engineering Division, Preventive Medicine Service, Surgeon General's Office.

### TECHNIQUE OF PARENTERAL INJECTIONS

Clinical studies strongly suggest that the virus of infectious hepatitis may be transmitted from one individual to another by means of syringes contaminated with minute amounts of blood or serum. Although the technique of administering single subcutaneous or intramuscular injections in Army hospitals is usually above reproach, carelessness in technique may occur when a number of injections are necessary. On a busy ward, where the parenteral administration of penicillin to a number of patients is required, it is sometimes the practice to use the same syringe for all injections, but to change the needles between injections. This practice should be discontinued. If a number of parenteral injections are to be given, the solutions should be drawn into separate sterile syringes and the syringes, with needles attached, should be placed in a sterile container. A convenient method is to place the syringes on a sterile towel on a tray and to cover the tray with another sterile towel. When a syringe has been used, it should not be replaced in the tray. Syringes and needles should be thoroughly rinsed after use. Before they are used again, they should be sterilized in an autoclave or by immersion in boiling water for at least thirty minutes. Needles should not be sterilized by placing them in alcohol.

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### SPECIAL SHOES FOR SOLDIERS WITH INJURED FEET

Those patients in Army hospitals who have partial foot amputations, deformities of the foot from severe fractures, or painful scars on the foot could bear weight and walk with a minimum of discomfort if shod in a properly constructed special shoe. The casts of feet received for the construction of special shoes at the Boston Quartermaster Depot have been mostly unsatisfactory. However, after years of research by a Boston corporation, a machine has been developed for making impressions of feet in a normal weight-bearing position. The patient stands in a box filled with small steel ball bearings, and beneath the box are two electromagnets which "freeze" the ball bearings into a solid mass, thus creating an accurate imprint of the foot. When necessary to decompress certain areas over tender scars, metatarsal heads, or exostoses, ball bearings are scooped out under the painful area before the foot cast is poured. Thus, the cork innersole which will be pressed from the cast will have a depression in exactly the right spot to relieve pressure over the tender area.

The Army has ordered ten of these machines for installation in key general hospitals, and Medical Department orthopedic mechanics are being thoroughly trained in operating them. Selected enlisted men, qualified as orthopedic mechanics (SSN 366), from each of the ten installations are being given

an eight-week course in the principles of orthopedic footwear and in the operation of these expensive and complex units. Training includes shoe construction, anatomy of the foot, use of the machine, fitting, and design.

In addition to the enlisted personnel thus trained, one medical officer from each of the ten hospitals is to attend an intensive one-week orientation conference at the Boston Quartermaster Depot, in order that he may be familiar with the use of the machine and the scope of its operation.

The Surgeon General assigned an orthopedic surgeon, Major S. S. Steinbergh, to the Boston Quartermaster Depot, to instruct the students in the medical aspects connected with deformity and special shoe requirements and to cooperate with the Quartermaster Corps in further development of technique. Attending these courses were enlisted orthopedic mechanics from hospital centers at Camp Edwards, Massachusetts, and Camp Carson, Colorado, and from the eight general hospitals where similar machines will be installed: Walter Reed, Washington, D. C.; Lawson, Atlanta, Georgia; Billings, Fort Benjamin Harrison, Indiana; Vaughan, Hines, Illinois; McCloskey, Temple, Texas; Bushnell, Brigham City, Utah; Dibble, Menlo Park, California; Madigan, Tacoma, Washington.

Casts of injured feet made at the designated hospitals will be sent to the Boston Quartermaster Depot orthopedic clinic and shop, where the molds, lasts, and patterns will be processed. The cast-making machines and the special shoemaking facilities of the Boston Quartermaster Depot orthopedic clinic will guarantee a standard procedure that will provide proper footwear for every soldier who incurs foot deformities.

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#### MANAGEMENT OF CASES OF TRAUMATIC OSTEOMYELITIS

Wound saucerization with subsequent grafting of the resulting soft-tissue and bony defect has proved an effective method of managing cases of traumatic osteomyelitis. Of forty-five cases in which this method of management was used by the authors, in all but two cases highly beneficial results were achieved. The majority of their patients presented complete epithelization of the wound surface within eight weeks of the application of a partial-thickness graft. The routine, designed to place the patient in the best possible general condition, includes preliminary measures such as transfusions of blood and plasma and the feeding of a high caloric, high vitamin diet. Moreover, during the preoperative period, preliminary laboratory and x-ray studies are made, penicillin therapy is instituted when indicated, and the operative site is carefully prepared for the saucerization procedure.

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Abstract of paper by Major Robert P. Kelly, Captain Louis M. Rosati, and First Lieut. Robert A. Murray.



The operative procedure begins with incision of the skin and subcutaneous fat along the line of juncture of normal with abnormal tissue. As the dissection develops by extending the incision into the more deeply situated structures, all scarred and otherwise abnormal tissues with sequestra or foreign bodies are excised. During the dissection, attention is directed to the wound topography, a saucer shape being desirable so as to facilitate subsequent skin grafting and the application of an effective pressure dressing. Normal bone may be sacrificed to achieve this desired wound shape, provided that the bone weakness thus created does not exceed that of the pre-existing weakness caused by the pathology under treatment. During the dissection any tendon denuded of its sheath or any exposed ligament which will not contribute to the anticipated function of its joint is excised. Every effort is made to preserve important structures by covering them with a flap of local healthy skin. When this is impossible, such structures must be sacrificed and subsequent reconstruction planned. On completion of the dissection, fine mesh gauze is laid over the wound and a pressure dressing of mechanic's waste applied. Four to seven days later the raw surface of the wound is covered with partial-thickness grafts. The interval between the two procedures permits the formation of granulations on relatively avascular cortical bone. The development of uniformly healthy granulations, however thin, within four days of saucerization is indicative of a healthy wound which is likely to respond favorably to grafting. Partial-thickness skin grafts obtained with the Padgett dermatome are applied to the defect, care being taken to avoid wrinkling. The free edges of the graft are sutured to the skin edges of the wound by untied running sutures. A pressure dressing is applied over an initial layer of fine mesh gauze to make certain that the graft is maintained in close contact with all surfaces of the wound. In this series of cases it was noted that grafts had usually "taken" by the end of six days and no longer required pressure dressings to maintain their contact with the wound.

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#### USE OF PARA-AMINO BENZOIC ACID IN CULTURE MEDIA

Evidence has been accumulating that concentrations of 2.0 mg. percent of para-aminobenzoic acid may inhibit the growth of certain organisms, particularly the meningococcus and gonococcus. Two-tenths mg. percent (0.2 mg. percent) of para-aminobenzoic acid is sufficient to neutralize the concentrations of sulfonamides encountered in most specimens submitted, and is recommended for incorporation in media used for blood, urine, and spinal fluid cultures. Media containing para-aminobenzoic acid up to 1.0 mg. percent may be used at the discretion of the laboratory officer in certain cases where an excessive amount of sulfonamide may be present in the specimen.

If the acid is not available, procaine hydrochloride may be substituted, weight for weight.

## FELLOWSHIPS IN THE MEDICAL SCIENCES

The National Research Council offers research fellowships in order to give special facilities for training and experience in research to persons who wish to devote themselves to an investigative career in the medical sciences. The fellowships are open, as a rule, to citizens of the United States and Canada who are not more than thirty years of age. Applicants must have the degree of Doctor of Medicine or Doctor of Philosophy, or equivalent experience and achievement in research. The fellowships are intended for the benefit of those who are in the early stages of their preparation for life work, and not for those already professionally established.

All branches of medicine are open to applicants. At present, however, candidates will be favored who express intention of following a career in one of the preclinical sciences or of approaching clinical medicine and surgery through a discipline in one of these sciences. For applicants in the latter group, thorough experience in a preclinical science, during which they become identified with this science as such and not primarily with its application to clinical studies, will be deemed essential. Applications for immediate practical work in clinical subjects will be favorably considered only in exceptional instances.

Fellows are expected to devote their entire time to research, except that with permission of the Board they may incidentally attend advanced courses of study. They may associate graduate students with their researches. They shall not engage in work for remuneration during the term of their appointment. The grants to fellows shall be determined by the Medical Fellowship Board in each case. Fellowships are allotted at annual meetings of the Board held in February. Applications to receive consideration at these meetings must be filed on or before 1 January. Fellowships may begin at any time and are usually granted for twelve months, with an allowance of six weeks for vacation to fellows working within the United States. At the end of a year the Board may renew the fellowship on request.

These fellowships are not granted to any institution or university. The place where the fellow chooses to work and the persons under whom he chooses to work are to be approved by the Board. Universities in which fellows plan to work must agree to supply the necessary facilities and equipment and will be requested to remit all fees. Only a limited number of appointments to work abroad are made, and then only to supplement fellowship training in the United States or because of special qualifications and opportunities.

Fellowship appointments are subject to the condition that after they are accepted by the applicants they shall not be vacated or the place of work changed within the year without the consent of the Medical Fellowship Board. Other univer-

sity appointment, and title, is permitted, provided it carries no additional salary.

#### **Filtrable Viruses and Orthopedic Surgery**

In addition to the Fellowships in the Medical Sciences which have been administered by the Medical Fellowship Board of the National Research Council since 1922, two other groups of research fellowships are available, made possible through a grant from the National Foundation for Infantile Paralysis, Inc.

The first group, open to applicants who hold either the Ph.D. or M.D. degree, is for the purpose of providing opportunities for special training and experience in the study of filtrable viruses. The second group, open only to graduates in medicine who have completed one or more years of hospital experience in clinical surgery and are planning a career in orthopedic surgery, is designed to provide opportunity for training and research in those basic medical sciences which will be of particular value in furthering progress in the field of orthopedic surgery. Address communications to the Secretary of the Medical Fellowship Board, National Research Council, 2101 Constitution Avenue, Washington 25, D. C.

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Tenth Mountain Medical Battalion demonstrates methods of evacuating the wounded from precipice in mountains of Italy used during the attack at Belvedere. Signal Corps photograph.

**CIVILIAN SPONSORED MEDICAL UNITS TO BE CONTINUED**

Army medical units sponsored and staffed by civilian institutions will be continued in an inactive reserve status as part of the postwar military establishment. Early in the war and in some cases before hostilities began, the War Department granted authority to certain civilian institutions to sponsor military units which required personnel with a high degree of professional or specialized training. This program made possible the orderly conversion of our country's professional and technical manpower from peace to war. Many of the sponsors have expressed hope that a similar relationship can be preserved, and, in response, the War Department has adopted the following policy:

"It will be the policy of the War Department to preserve affiliated units and sponsored units for possible use in the postwar Army. Continued sponsorship of units by business firms and institutions during the postwar period will not only preserve interest in national security, but will also speed the reactivation of units whenever necessary. Moreover, the historical continuity of these units will be assured if they are inactivated rather than disbanded. This should materially enhance the pride of the sponsoring organization in its unit. Affiliated units will become a part of the reserves."

<i>Unit</i>	<i>Affiliated with</i>
2d Evacuation Hospital	St. Luke's Hospital, New York City
7th Evacuation Hospital	New York Postgraduate Hospital, N. Y. C.
9th Evacuation Hospital	Roosevelt Hospital, New York City
12th Evacuation Hospital	Lenox Hill Hospital, New York City
18th Evacuation Hospital	(inactive) Methodist Hospital, Indianapolis
22d Evacuation Hospital	(inactive) Milwaukee County Hospital, Wauwatosa, Wisconsin
25th Evacuation Hospital	West Suburban Hospital, Oak Park, Illinois
27th Evacuation Hospital	University of Illinois, Urbana, Illinois
35th Evacuation Hospital	Gallinger Municipal Hospital, Washington
38th Evacuation Hospital	Charlotte Memorial Hospital, Charlotte, N. C.
45th Evacuation Hospital	West Suburban Hospital, Oak Park, Illinois
46th Evacuation Hospital	(inactive) University of Georgia, Augusta
48th Evacuation Hospital	Rhode Island Hospital, Providence
49th Evacuation Hospital	(inactive) Starling Loving, University of Ohio, Columbus
50th Evacuation Hospital	(inactive) City Hospital, Worcester, Mass.
55th Evacuation Hospital	(inactive) Ancker Hospital, St. Paul, Minnesota
56th Evacuation Hospital	Baylor University Medical School, Houston, Texas
73d Evacuation Hospital	Los Angeles County General Hospital, Los Angeles, California
77th Evacuation Hospital	University of Kansas Hospital, Kansas City
1st General Hospital	Bellevue Hospital, New York City
2d General Hospital	Presbyterian Hospital, New York City
3d General Hospital	Mt. Sinai Hospital, New York City
4th General Hospital	University Hospitals, Cleveland, Ohio
5th General Hospital	Harvard University, Boston, Massachusetts
6th General Hospital	Massachusetts General Hospital, Boston

7th General Hospital	Boston City Hospital, Boston, Massachusetts
9th General Hospital	New York Hospital, New York City
12th General Hospital	Northwestern University, Chicago, Illinois
13th General Hospital	Presbyterian Hospital, Chicago, Illinois
17th General Hospital	Harper Hospital, Detroit, Michigan
18th General Hospital	Johns Hopkins Hospital, Baltimore, Maryland
19th General Hospital	Rochester General Hospital, Rochester, N. Y.
20th General Hospital	University of Pennsylvania, Philadelphia
21st General Hospital	Washington School of Medicine, St. Louis
23d General Hospital	Buffalo General Hospital, Buffalo, New York
24th General Hospital	Tulane University, New Orleans
25th General Hospital	University of Cincinnati, Cincinnati, Ohio
26th General Hospital	University of Minnesota, Minneapolis
27th General Hospital	University of Pittsburgh, Pittsburgh, Pa.
29th General Hospital	University of Colorado, Denver, Colorado
30th General Hospital	University of California, San Francisco
31st General Hospital	Denver General Hospital, Denver, Colorado
32d General Hospital	Indiana University Hospital, Indianapolis
33d General Hospital	Albany Hospital, Albany, New York
36th General Hospital	Wayne University, Detroit, Michigan.
37th General Hospital	Kings County Hospital, Brooklyn, New York
38th General Hospital	Jefferson Medical College, Philadelphia
39th General Hospital	Yale University, New Haven, Connecticut
42d General Hospital	University of Maryland, Baltimore, Maryland
43d General Hospital	Emory University, Atlanta, Georgia
44th General Hospital	University of Wisconsin, Madison, Wisconsin
45th General Hospital	Medical College of Virginia, Richmond
46th General Hospital	University of Oregon, Portland, Oregon
47th General Hospital	College of Medical Evangelists, Los Angeles
50th General Hospital	Seattle College, Seattle, Washington
52d General Hospital	Syracuse University, Syracuse, New York
58th General Hospital	Western Pennsylvania Hospital, Pittsburgh
64th General Hospital	Louisiana State University, New Orleans
65th General Hospital	Duke University, Durham, North Carolina
67th General Hospital	Maine General Hospital, Portland, Maine
70th General Hospital	St. Louis University, St. Louis, Missouri
71st General Hospital (disbanded)	Mayo Clinic, Rochester, Minn.
79th General Hospital	Long Island College of Medicine, Brooklyn
105th General Hospital	Harvard University, Boston, Massachusetts
108th General Hospital	Loyola University, Chicago, Illinois
118th General Hospital	Johns Hopkins Hospital, Baltimore, Maryland
127th General Hospital	University of Texas, Galveston, Texas
142d General Hospital	University of Maryland, Baltimore, Maryland
297th General Hospital	Cook County Hospital, Chicago, Illinois
298th General Hospital	University of Michigan, Ann Arbor, Michigan
300th General Hospital	Vanderbilt University, Nashville, Tennessee
364th Station Hospital	Pennsylvania Hospital, Philadelphia
64th Surg. Hospital (disbanded)	St. Marys Hospital, Pueblo, Colorado
30th Port Surg. Hospital	University of Texas, Galveston, Texas
31st Port Surg. Hospital	University of Louisville Medical School, Louisville, Kentucky
42d Port Surg. Hospital	Marquette University, Milwaukee, Wisconsin

### LOAN OF LANTERN SLIDES ON SKIN DISEASES

The Army Institute of Pathology, Army Medical Museum, has prepared a number of sets of Kodachrome standard-sized lantern slides on skin diseases that were selected from the Institute's files by the consultant in dermatology in The Surgeon General's Office. These sets of 62 slides each are available on loan to Medical Department installations for the purpose of orienting medical officers on the type and incidence of skin diseases occurring among military personnel, and particularly to acquaint officers who are being redeployed to the tropics with the special problems there.

The original photographs were made by members of the photographic units sent out by the Institute to all the theaters of operations. There are now several thousand black-and-white and over 300 Kodachrome photographs, in the Institute's files, that cover comprehensively the skin diseases that have been problems in all parts of the world.

The sets are available on application to the Director, Army Institute of Pathology, Army Medical Museum, Washington 25, D. C.

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### DIPPING SCREENS WITH 5 PERCENT DDT

When a fly-control program was being considered early in 1945 at Fort Devens, the magnitude of the job of treating screens was apparent, as there are more than 100 mess halls. With assistance from the post engineers a two-wheeled metal trailer was remodeled and used for dipping mess-hall screens in 5 percent DDT (Q.M. No. 51-I-305). The trailer was hooked behind a small truck, and, by partially filling it to minimize spillage, the trailer could be moved from one mess hall to another. The procedure, as reported by First Lieut. John B. Belknap, Sn.C., was as follows:

The various units on the post were requested in advance to remove the screens and pile them near the garbage stand in order to save time. A six-man crew of German P.Ws. was used, working under the direction of an enlisted man. Two of them, wearing rubber gloves and aprons, did the actual dipping, two others carried the screens to and from the trailer. The treated screens were stacked beside the garbage stand and usually were allowed to dry overnight before being put back on the windows. The other two men operated hand sprayers and treated screen doors, in place, the garbage rack area, and outside surfaces in the vicinity of the rear mess hall (kitchen) door.

The time consumed in treating one mess hall averaged seven minutes. The amount of solution required is about one pint per screen. There is some loss of material because of drainage after the treated screens are stacked.

The entire camp was covered in May and again in July. The operation required less than a week to complete. The re-

sults have been excellent. It has not been necessary to spray the interior of mess halls, and fly traps are being used to a limited extent. Strips of fabric, treated with DDT, are hung in mess halls and have effectively controlled the few flies which entered. It is believed that the above method of control is particularly adapted to a large post having numerous mess halls. Another advantage is that the personnel used for this work is not tied up for a long time and is available for other types of work during most of the summer.

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#### **POSTWAR PROGRAM OF AMERICAN COLLEGE OF PHYSICIANS**

The Board of Regents of the American College of Physicians, at a meeting on 10 June 1945, adopted the following postwar educational program:

1. The re-establishment and extension of the American College of Physicians research fellowships, the annual stipend for which will vary between \$1,500 and \$2,500 per annum.

2. The initiation of clinical fellowships (an initial appropriation of \$25,000 has been made, and it is hoped that some of the Foundations and possibly some of the ethical manufacturers may supplement these funds).

3. While the College will continue its participation in and its cooperation with the Central Committee on Postwar Planning for Medical Service (American Medical Association, American College of Surgeons, American College of Physicians, et al.), it will have its own individual program for its members and will attempt to provide adequate postgraduate courses, both of the refresher and review short type and, if possible, longer courses. It is also proposed to have a program of assistance to members in locating residencies, assistantships, and places or locations for practice.

4. To carry out this proposal the College plans to appoint in the very near future an educational director who will devote all of his time and energies to this program.

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#### **PATIENTS KEEP IN TOUCH WITH OLD UNITS**

Patients in Army hospitals throughout the United States are enabled to keep in touch with their comrades and old outfits through the free distribution of the magazine, "Outfit," a weekly publication of the New York Branch, Information and Education Division, Army Service Forces. The magazine consists of sixteen pages of news and pictures about Army units now overseas. The first issue was distributed in U. S. Army hospitals in November 1944, since when it has established bureaus consisting of one officer and enlisted assistants in all overseas theaters.



**BRIGADIER GENERAL FREDERICK A. BLESSE**

Brigadier General Frederick A. Blesse, Chief Surgeon, Army Ground Forces, has been a member of the Army Medical Corps since 1917. He is a native of Illinois, a graduate of Hahnemann Medical College, the Command and General Staff



School, Army War College, the Army Medical School, and an honor graduate of the Medical Field Service School, Carlisle Barracks. General Blesse was made Surgeon of GHQ when it was organized in July 1941 and after the reorganization of the Army remained as Surgeon of the Army Ground Forces. He was Chief Surgeon of the North African Theater of Operations from March 1943 until May 1944. He has served on the War Department General Staff, in The Surgeon General's Office, as an instructor at the Medical Field Service School, in the Panama Canal Zone, and was

medical adviser to the Philippine Government, on the staff of General MacArthur, with the responsibility of organizing, training, and equipping the Medical Department of the Philippine Army. General Blesse received the Distinguished Service Star from the Philippine Government in 1940 and the Legion of Merit in November 1943.

**REPORT OF AURAL REHABILITATION PROGRAM**

Deaf cases in the Army are to be sent to the aural rehabilitation centers at Borden General Hospital, Chickasha, Oklahoma; Hoff General Hospital, Santa Barbara, California; and Deshon General Hospital, Butler, Pennsylvania, as set forth in War Department Circular No. 81 (23 February 1944). These centers have well-established programs for the coordination of the medical and surgical treatment of deafness, coincident with the fitting of hearing aids, lip-reading instruction, and auricular training. All that can possibly be done for the deaf patient is being done in the hearing centers.

The convalescent reconditioning units associated with the



three designated hospitals have proved a great advantage, for soldier patients live as soldiers while attending classes of instruction in the aural rehabilitation program. In addition to the classroom instruction, a full program of activity is carried on by the reconditioning service, which has aided materially in the psychological adjustment of the deafened.

Recently, methods have been developed for the manufacture of acrylic ear inserts by the dental services at the aural rehabilitation centers. Soldiers needing air-conduction hearing aids receive the benefits of these "tailor-made" ear inserts. This local manufacture of ear inserts has been an extremely valuable part of the aural rehabilitation program, for a well-fitting prosthesis increases efficiency of the hearing aid.

Methods of fitting hearing aids, procedures for testing hearing, tests for malingering, and tests for functional hearing losses are constantly being revised; and rapid progress in these fields is being realized. In the near future The Surgeon General's Office will announce a servicing policy for hearing aids.

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#### BRaille WRITERS FOR BLINDED CASUALTIES

In teaching blinded casualties to write, Army hospitals have discovered that the regular braille stylus and slate are not practicable for casualties who have multiple handicaps of the arms or fingers. Therefore, a braille writer, roughly comparable to the typewriter for the seeing person, has been developed. Casualties with two or three fingers and an artificial hand can use the artificial hand to operate the spacer on the braille writer and can use the fingers of the other hand to locate and operate the keys which produce the writing. The use of the writer will not be confined to the blinded casualties who have arm and finger defects, for it can be profitably employed by *all* blinded casualties. The number of writers required for all purposes, however, will not be large.

It is essential that blinded casualties become acquainted with braille writing early in their convalescence; otherwise, their interest may never be aroused. The ability to write will aid the blind soldier, on discharge, to be self-supporting. The Surgeon General has directed that immediate action be taken to expedite the production and delivery of braille writers, in order that the Medical Department's plan for the rehabilitation of blinded casualties can proceed rapidly. An emergency priority rating has been obtained from the War Production Board; and as the writers are produced by two leading typewriter manufacturers, they will be shipped to Dibble General Hospital, Valley Forge General Hospital, and Old Farms Convalescent Hospital, where rehabilitation programs for the blind are now operating.

### FOLLOW-UP SYSTEM IN A BATTALION AID STATION

An infantry battalion surgeon feels the lack of continued observation and follow-up of the individual patient to a greater extent, perhaps, than any other class of medical officer.

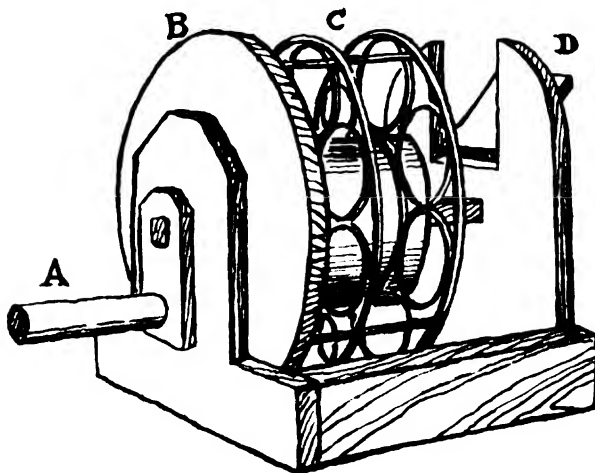
A simple, flexible, efficient follow-up system was employed in the 2d Battalion Aid Station, 135th Infantry, in Italy from January to July 1945, and it was successful both in and out of combat, Captain Paul A. Kirschner, M.C., reports. It consisted of a self-addressed V-mail blank, bearing a typewritten request to the hospital medical officer to record in the space provided the diagnosis, progress, clinical and laboratory findings, recommendations, etc. This form was affixed to the emergency medical tag of the patients. Eighty-five to 90 percent of such letters were returned. Several enthusiastic comments were received.

This plan benefited the patients as well as the battalion surgeon. In case of the former, the proper type of after-care and follow-up treatment could be given. For the latter it served as an educational aid and a stimulus to diagnostic acumen.

### AN IMPROVISED SHAKER FOR WHOLE BLOOD

The efficient transfusion of whole blood requires that a few simple rules be followed, one of which is that blood must be thoroughly agitated from three to five minutes before attempting to administer it. Neglect of this precaution leads

to loss of both time and blood, because precipitated fibrin obstructs some portion of the recipient set. Agitation is usually accomplished manually, thus consuming precious time, especially in combat area hospitals.



The improvised device reported by Private James M. Underwood, Medical Detachment, 31st Field Hospital, is designed to permit the shaking of eight bot-

tles of blood simultaneously. Obviously more efficient shakers could be provided, but this one has the important advantage of simplicity. In the drawing, *B* is a movable wooden disk, which is rigidly attached to the handle *A*. The wire rack *C*, supplied in duplicate with each box of blood, contains compartments for eight bottles. It is firmly attached to *B* and moves with it.

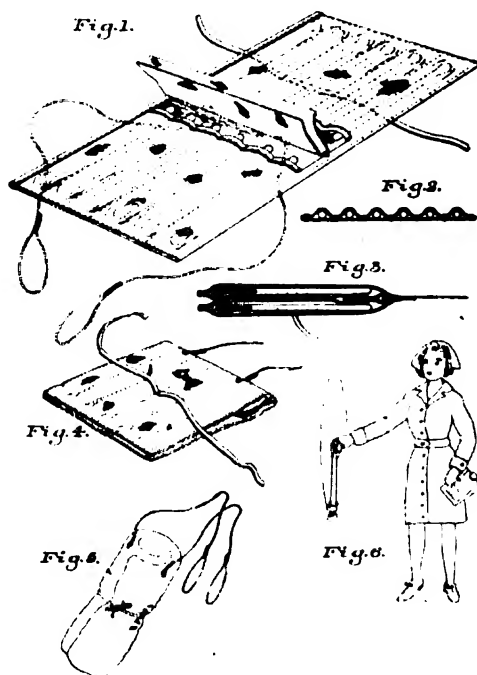
*D* is a trap door, opening outward, through which bottle of blood may be introduced into rack *C*. When *D* is closed, the bottles are retained during agitation.

This simple shaker, used in the preparation for transfusion of hundreds of bottles of whole blood, has proved a valuable timesaver.

#### FEVER THERMOMETER CENTRIFUGE

A simple method for "shaking down" several clinical thermometers at one time has been devised by Corporal Eino W. Hintsala of the 119th Station Hospital. While the illustration shows a shaker with a capacity of twelve thermometers, it is feasible to construct a device which will accommodate any desired number. The case, made of canvas or other durable material, contains pockets for the thermometers. Each instrument is placed in a separate compartment, the bulb end being inserted first. A flap then covers the thermometer ends, preventing contact, and possible breakage, with those in the opposite compartments. The case, which closes like a book, is rolled and tied with a safety cord sewed on the outside of the case. Two loops are sewed on the margin. By holding these loops in the hand and twirling the case in the air as one would a ball on a string, the mercury in the thermometer is forced down by centrifugal force.

This item has been presented for patent under the provisions of AR 850-50, but since a license to the Government will be executed, field improvisation of this device for official use may be made.



#### TECHNIQUE FOR STAINING MALARIA SMEARS

In the article by this title in the May *Bulletin*, page 113, the authors state, under the preparation of Solution A, that  $\text{Na}_2\text{PO}_4$  is used. Lieut. Colonel William B. Wartman, M.C., writes that this is incorrect since the salt used is  $\text{Na}_2\text{HPO}_4$ . This mistake was copied from Wartman's article where it occurred as a typographical error in *Army Medical Bulletin* of July 1943.

### ALTERATION OF RUBBER CRUTCH TIPS

A number of unsatisfactory rubber crutch tips (Med. Dept. Item No. 3664000) are being used in amputation centers. They have smooth bases and do not provide sufficient friction on polished floors. Consequently, some patients have slipped and injured themselves.



FIGURE 1. A. Chuck. B. Spindle. C. Crutch tip. D. Cutting tool. E. Inset screw.

The production of crutch tips with vacuum cup or other friction-producing bases is insufficient to supply present demands, and, until procurement can be increased, it will be necessary to continue the issue of the smooth-based crutch tip. It is recommended that amputation centers use the process developed at the Lawson General Hospital to render these crutch tips safe, by producing a vacuum cup at the base.

The equipment used for this purpose includes a standard metal lathe of any size, chuck for lathe, spindle to hold crutch tip (this can be made from a  $\frac{1}{4}$ -inch metal pipe, 4 inches in length), board to straighten crutch tip, and crucible steel cutting tool,  $\frac{1}{4}$ -inch (this tool, which can be made from an old file, will cut about fifty crutch tips before having to be replaced).

#### Procedure

Fit the spindle inside the crutch tip, and insert spindle in the chuck. Tighten inset screw barely enough to hold the crutch tip and spindle in the chuck. Place the board for straightening crutch tip (figure 2) on the side runners of the lathe, and press it firmly against the base of the crutch tip. Tighten inset screw on the chuck. Remove board from lathe. Start motor and move cutting tool so that its point is centered on the base of the crutch tip. Move cutting tool to the outside edge of the crutch tip and cut off the rubber to a depth of  $\frac{1}{8}$  inch on the outside edge (this will produce an almost flat base on the crutch tip). Place cutting tool about  $\frac{1}{4}$  inch from the outside edge of the crutch tip and cut straight in to a depth of  $\frac{1}{4}$  inch. Move cutting tool alternately in and out, cutting shallow and deep grooves, thus producing a suction-type base.



FIGURE 2. A. Board to straighten crutch tip. B. Tightening the inset screw.

## IMPROVED METHOD FOR HEATING WATER IN THE FIELD

A simple method of heating water in the field has been developed and tested at the Medical Field Service School, Carlisle Barracks, Pennsylvania. This improved method, Captain William W. Stiles, M.C., reports, saves time and fuel and involves only two minor changes from the time-honored fire trench.

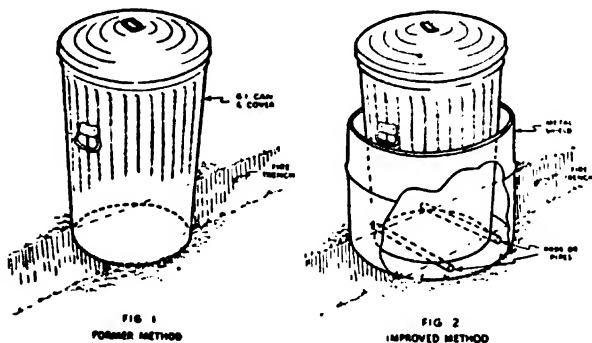


Figure 1 illustrates a common method of heating water in the field—simply a galvanized iron can over a fire trench. A marked improvement is effected by merely supporting the can on two iron

rods or pipes and surrounding the can with a metal shield (figure 2). The rods or pipes are cut long enough to support the G.I. can but short enough to allow the shield to rest on the ground. An improvised shield can be made from half a 55-gallon steel drum with the ends removed. The shield, water heater case, supplied with the gasoline field range, 1937 model, serves the same purpose.

Outbreaks of infectious diarrheas have often been attributed to inadequate sterilization of the mess gear. Inadequate sterilization is usually caused by failure to heat rinse water to a "rolling" boil. This failure to provide rinse water of the proper temperature is, in turn, due to inadequate heating facilities or insufficient time or fuel, or a combination of these factors.

The improved method offers the following advantages: (1) The surface exposed to the flame is increased; (2) heat lost by radiation from the G.I. can is reduced; (3) the shield acts as a chimney and directs the flame into more intimate contact with the can regardless of wind conditions; and (4) a soldier may approach the can to wash his mess gear without danger of being burned.

Composite results of tests made in the field are shown in

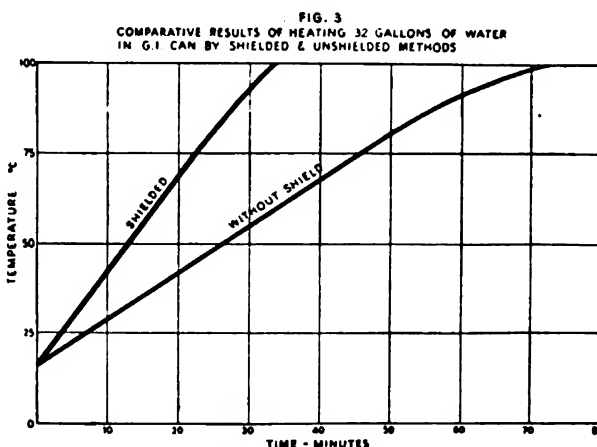


figure 3. It will be seen that the time required to heat 32 gallons of water was reduced from seventy-two to thirty-three minutes, with a corresponding reduction in fuel consumption. To assure accuracy in these tests, improvised gasoline burners were used which were identical; moreover, to assure identity, the same burners were used alternately with and without the shield. It was estimated in the former method (figure 1) that only 192 square inches of the G. I. can were exposed to the flame, but in the improved method (figure 2) 1,404 square inches were heated. Conversely, 2,220 square inches of the can radiated heat to the air when no shield was used, and only 1,008 square inches when a shield was used.

The simple expedient of using two bars and the shield increased the heating efficiency nearly 100 percent, reduced the fuel consumption about 50 percent, and cut in half the time required to heat the water.

#### PORTABLE CHART RACK

With an increased number of patients making the ward surgeon's load heavier, a portable chart rack or a portable view box for the demonstration, roentgenologically, of a lesion or fracture during ward rounds is most desirable, especially on pulmonary disease, thoracic surgery, gastrointestinal, or orthopedic services.

The portable chart rack illustrated can be constructed easily by patients in the occupational therapy department. Built of light wood and fitted with casters, it can be pushed from one patient's bed to another. The superior border (A) is scalloped to hold the charts properly. On one side, two spaces, 15 by 18 inches, are built to contain the necessary x-ray studies (B). These two compartments are slightly larger than the size of the standard chest x-ray envelope. On one end, a drop-leaf support (C) is attached. This platform is of sufficient length and extent to support an x-ray view box adequately and firmly. When not in use, the leaf can be lowered to the side. The base (D) can be used



Portable chart rack, with view box, at the bedside.

to carry various instruments, such as sphygmomanometer, ophthalmoscope, reflex hammer, and supplies.

With the aid of this portable chart rack, the patient can be examined quickly and his case presented in detail. The pertinent x-rays can be studied and evaluated with the proper lighting and without confusion.

Colonel Julien E. Benjamin, M.C., and Major Algernon N. Alpern, M.C., report having used this rack for the past six months. It has facilitated the therapy and disposition of patients and resulted in many suggestions aiding in the diagnosis and treatment of various cases.

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#### TEST TO DIFFERENTIATE MYL POWDER FROM DDT POWDER

Standard Army nomenclature does not specify the active ingredient of many of the insecticidal preparations. For example, Q.M. item 51-I-173 is merely designated "Insecticide, powder, louse, 2-ounce can." It may be 10 percent DDT powder, or, if old stock, it may be MYL powder with pyrethrum as the active principle.

Major Abram S. Benenson, M.C., reports that a simple test requiring minimal laboratory facilities will aid to differentiate insecticide containing organic chlorine compounds (such as DDT) from old stock powder with pyrethrum as the active principle. The bottom of a test tube is covered with the powdered material and the tube is heated in a flame to char the contents. If a liquid, the solvent is boiled off and the residue heated to charring. Certain organic chlorine compounds (such as DDT) burn, giving off HCl fumes which will turn moistened litmus paper from blue to red if it is held in the mouth of the tube. Further evidence of HCl gas is indicated by copious white fumes of ammonium chloride, if ammonia fumes are brought into contact with the mouth of the test tube.

The following DDT samples have given HCl vapors under the conditions described: larvicide, DDT, dissolving; larvicide, DDT, dusting; louse powder (10 percent DDT in pyrophyllite); and alcoholic and kerosene solutions of DDT. Other insect powders gave negative results: MYL; commercial roach powder (pyrethrum and sodium fluoride); and rotenone-lethane insecticide, as well as liquid preparations containing thanite, lethane 384, lethane 384 special, and commercial-base fly spray.

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Dr. H. L. Haller, chemist, Insecticide Investigations, U. S. Department of Agriculture, believes that a simpler test for differentiating between DDT louse powder and the MYL powder would be to extract a small sample by shaking in a test tube with a solvent like ether or gasoline, decanting the solution and allowing it to evaporate. DDT louse powder would leave a characteristic crystalline residue, whereas the MYL powder would produce a viscous oil or resin.



**STIMULATOR FOR USE IN PERIPHERAL NERVE SURGERY**

The Army Medical Department ophthalmoscope, or otoscope, battery handle (Med. Dept. Items Nos. 3402900 and 3404200) has been found to lend itself to use as a stimulator in peripheral nerve surgery. The National Electric Instrument



Company instruments are especially adaptable, and they are found at most Army hospitals. These battery handles have a rheostat, a socket for the usual flashlight bulb, and binding-post holes for accommodating boilable rubber-insulated wire cords. Except for the stimulator points, which are made from heavy-gage-copper wire or paper clips, all of these parts are found in either of the diagnostic sets. The photograph shows the setup. The rheostat enables one to vary the current, and the bulb gives a visual index of the intensity of the current. In addition, the bulb acts as a safety signal, for when the stimulator points are shorted with a forceps, the light goes out. This simple test indicates that the instrument is working.

This use of the diagnostic-set parts does no harm to these instruments.

First Lieut. Hugo V. Rizzoli, M.C., and Captain William Lyons, M.A.C., report that this stimulator has been found to be very satisfactory in use in the neurosurgical section at Hallock General Hospital. It is recommended that this simple adaptation be used rather than operating without a stimulator.

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**DENTAL LEGISLATION**

Senate Bill, S.916, introduced in the first session of the 79th Congress by Mr. Johnson of Colorado on 16 April 1945, became law 30 June 1945. This bill provided for a change of that section of the existing law (act of 3 March 1917, 36 Stat. 1054) which stated that officers of the Dental Corps of the Army have no right to command except within that corps. Such limitation was not placed on officers of the Medical Corps, the Veterinary Corps, the Pharmacy Corps, the Medical Administrative Corps, or the Sanitary Corps, all such officers being entitled to command within the Medical Department generally.

Although the officers of the Dental Corps now have equal command privileges with other officers of the Medical Department, this law does not provide that dental officers may command a hospital. Hospital commands are delegated to Medical Corps officers in accordance with Army Regulations.



### THE LIBRARY AT CRILE GENERAL HOSPITAL

Although restricted to a small space, careful planning of shelving and racks for the books and journals in the medical library of the Crile General Hospital has resulted in efficient functioning. Technician Fifth Grade Sylvia Huttman, W.A.C., reports that the library has 525 volumes and regularly receives 57 journals; in addition, loose-leaf folders are available containing War Department technical bulletins and manuals, and some other publications. The Medical Center of Cleveland and the Cleveland Medical Library are nearby, and there is daily transportation between the libraries for any journal, manual, text, or monograph requested. The officers make daily use of this service, as many as thirty requests being supplied in one day. Staff and seminar programs are forwarded to the librarian, who sets up a table with late, relevant literature. Training programs are



FIGURE 1. A corner of the library.



FIGURE 2. Penicillin exhibit.

handled in the same fashion. In this manner the wants of all are anticipated, and stimulation to scientific reading is secured.

A corner of the library room is shown in figure 1. Hours are from 0800 to 1700 daily, with three evenings a week running to 2100 hours. The librarian is present at all times. Journals and books may be checked out at 1600 hours and returned the following morning at 1000 hours.

The staff has appreciated the weekly displays on special topics, including current literature and pictures, an example of which appears in figure 2.

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#### LIBRARY NEWS LETTER

The Army Medical Library is now issuing a *News Letter* to the consultants as a means of keeping them informed of occurrences in the Library. An addition of 31 library staff members has been authorized bringing the total authorized personnel to 156, including 6 military and 150 civilian employees. Eighteen members are at present assigned to the Cleveland Branch. Installation of a Fonda film processing machine which is capable of processing both 16-mm. and 35-mm. film has just been completed. A paper processing machine and an automatic continuous enlarger are also now in process of installation. These will be used in the production of 8-inch photoprints on the same principle as that now used by V-mail units. This process will greatly reduce photostat and photoprint costs and will save considerable time in processing requests for film. The number of incunabula in the Library is now 513, ten having been purchased the past year. The recently issued K-L volume of the Index Catalogue is the largest of the 56-volume set from the standpoint of number of subject and author entries. There are over 6,000 medical and scientific subjects represented, with a total of 105,000 references. Western Reserve University has conferred on Colonel Harold W. Jones the degree of Doctor of Laws in recognition of his work in reorganizing and expanding the services of the Library.

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#### BENZEDRINE INHALERS

The manufacturer of benzedrine inhalers has informed the Office of The Surgeon General that numerous requests for these inhalers are being received from individuals overseas. Many of the requests contain money orders for the purchase of these inhalers.

Benzedrine inhaler (Med. Dept. Item No. 9102910) should be obtained through normal supply channels. The basis for issue, as announced in ASF Catalog MED-4 (April 1945), is one per individual per year, except on flying duty; and two per individual per year on flying duty. Since the item is readily available in supply installations, military personnel should not direct their requests to the manufacturer.

### OCCUPATIONAL THERAPY EQUIPMENT

It was necessary in the past to restrict general and convalescent hospitals in the submission of requisitions for occupational therapy equipment and supplies. During recent weeks, however, the quantities procured have greatly increased. Eighty-five percent of the required supplies and equipment has now been delivered to the St. Louis Medical Depot, and the remaining 15 percent is scheduled for delivery by 10 October. General and convalescent hospitals, therefore, may submit requisitions direct to the St. Louis Medical Depot for authorized quantities, with the expectation that the supplies will be received without delay. Back orders may be established for about 15 percent of the requisitions, but it is anticipated that additional receipts will soon make it possible to fill all requirements.

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### RECONDITIONING PROGRAM ON HOSPITAL SHIPS

The Surgeon General's Office has received a report from the Chief of Transportation, describing convalescent reconditioning on hospital ships. At present, 22 hospital ships are carrying on a program which the commanding officers feel has been of great benefit to patients. By means of questionnaires, it was learned that a small percentage of personnel returning as patients had experienced anything previously in the nature of reconditioning. Therefore, the problem of hospital ship reconditioning, which had been thought to be one of continuing a program initiated elsewhere, turned out to be one of orienting and indoctrinating the patient in reconditioning principles and practices.

Reconditioning programs aboard hospital ships require flexibility because of seasonal changes and voyage conditions. Occasionally physical exercise has to be omitted during the entire trip because of rough seas. During summer, the program must be extended to later hours for the exhibition of motion pictures on deck.

Early in the hospital ship program, because of previous lack of orientation of patients, there was a decided reticence to participation in physical exercise. By improving orientation and by modifying technique, this difficulty has been overcome. Prominent features of a typical program which extended daily from 0700 to 2130 were: a physical exercise period, news and radio broadcasts, motion pictures, quiz session, request musical transcription programs, information and orientation period, variety show, group games, and the handicrafts. The patients' favorable reaction toward the program has been of great significance in reducing and eliminating the long hours of idleness usually concurrent with a long sea voyage.

**CONTROL OF METHYL BROMIDE GAS IN DISINFESTATION**

Methyl bromide in gas form has largely replaced steam in Army installations for the disinfestation of clothing and equipment arriving in this country from overseas. The use of methyl bromide has the advantage over the use of steam in that it will not harm wool and leather, but care must be exercised because of its toxicity to man.

Personnel enter the disinfestation station through a receiving room where all clothing and small personal articles are placed in coarse mesh bags, which are then routed to the gas chambers while the individuals are sent through the shower baths, then partially sprayed with nontoxic liquids for body disinfestation and given a brief medical examination.

During this period, the bags of clothing are loaded on racks and wheeled into the gas chambers, the doors are sealed, and the methyl bromide gas is released. After a prescribed period the doors are opened slightly, and the free methyl bromide is removed from the chamber by mechanical exhaust ventilation. When the major part of the gas has been withdrawn, the racks are wheeled out of the chamber and the clothing distributed to the owners in the waiting room.

While the entire disinfestation process requires one to two hours, the individuals being processed are exposed to methyl bromide in the air only after they enter the waiting room, a period of exposure of less than one hour. Under these conditions the concentrations of methyl bromide as determined from studies in disinfestation stations indicate that only continuous exposures of eight hours or more are significant. Therefore, only the permanent members of the disinfestation staff who may be exposed for as much as twenty-four hours need be considered. A maximum allowable concentration of thirty parts of gas per million parts of air for continued exposure has been adopted by the Army.

The clothing from the gas chambers retains some free gas pockets within the folds; in addition, some residual gas is strongly retained within the material and is released slowly even after the clothing is unfolded. The amount of gas held within the material is sufficient to build up significant concentrations in the rooms unless additional control measures are taken beyond general room ventilation. Some stations have special "shake-out" rooms where the clothing is removed from the bags and shaken over an exhaust-ventilated bench. The clothing is then returned to the bags and taken to the dressing room, which is equipped with general exhaust ventilation.

The best experience available suggested a maximum limit of thirty parts of methyl bromide per million parts of air, which was adopted by the Army pending further toxicologic study. The use of methyl bromide in the disinfestation of clothing usually creates a borderline exposure under present

From the Army Industrial Hygiene Laboratory, Baltimore, Md.

standards; i.e., the concentrations do not greatly exceed the allowable limit; yet they cannot be ignored. The highest exposures occur at the disinfestation chambers when the clothing, thoroughly impregnated with the gas, is unloaded. For short intervals the concentrations of gas in these areas may well exceed the allowable limit. If the disinfestation chambers are flushed with fresh air for a short period with the doors slightly open, as required in operating instructions, the free gas is removed from the chamber and the concentrations then encountered by the operators in distributing the bags can be controlled by general ventilation or by locating the chambers in partially inclosed spaces adjacent to the main building.

Most of the trapped gas may be removed in a shake-out operation, but low concentrations may occur in the air at any point beyond the shake-out room. Normal room traffic, together with the slow rate of release of the residual gas, tends to prevent hazardous concentrations at those points, such as the dressing room, assembly area, or fingerprint room. However, the concentrations sometimes exceed the thirty parts of gas per million parts of air, and the exposure, while not serious, should be controlled.

The shake-out operation should be supervised closely, since its success depends on the vigor with which the clothing is shaken. This is usually done over a long table having a slotted grille top. The air is exhausted through the grille, and controlled air movement is maintained by introducing supplied air on the opposite side of the room. Fresh air will then continually sweep past the men performing the shake-out operation and prevent gas from spreading into the room. It is necessary to keep the doors closed while the room is in use and to rate the air supply system about 10 percent lower than the exhaust system. The volume rate of air flow should be based on a minimum average face velocity at the stalls of 75 linear feet per minute.

The dressing rooms and other areas used after the shake-out room will require general ventilation sufficient to give at least one air change every four minutes. It is good practice to check all locations occasionally with the "halide lamp" (halogenated hydrocarbon detector, Med. Dept. Item No. 4209600) to guard against leaks from the disinfestation chamber doors or excessive gas concentrations in any room.

Under present standards, the health hazards from exposure to methyl bromide gas in the disinfestation of clothing, as carried on by the Army, can readily be controlled within safe limits.

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**Patient's Record of Syphilis Treatment.**—The new Medical Department Form 78a is the patient's record of syphilis treatment. It is to remain in his possession at all times. The form is initiated and maintained by the surgeon, who is responsible for the recording of each treatment.

### SHIPPING AND STORING X-RAY FILM

Improper storage conditions for x-ray film in transit and in depots in the field in the tropics result in hospitals receiving film which is totally unfit for use.

This material consists of a cellulose acetate base, coated on both sides with a gelatin emulsion impregnated with silver halide salts. These substances are subject to certain deleterious effects when stored under conditions of excessively high temperatures and relative humidity. The latter condition is not especially serious prior to opening the original package, which contains a moisture- vaporproof barrier that prevents the absorption or condensation of moisture within the package on change of temperature. But high temperatures cause rapid deterioration and, in effect, transform the silver bromide into metallic silver, so that, on developing, the film shows an overall blackening, rendering it unfit for diagnostic purposes.

Film in transit should be shipped as refrigerated cargo. Under no circumstances should it be exposed to temperatures in excess of 80° F. for even short periods of time. Films should be stored in an air-conditioned or refrigerated area, with relative humidity ranging between 40 and 60 percent. Relative humidity below 40 percent rarely causes damage, but humidity above 60 percent will cause serious damage, unless the air is dried. Relative humidity is usually higher in lower temperatures. Even in refrigerated storage, therefore, the temperature should not be lowered enough to cause the humidity to exceed 60 percent.

X-ray film and other sensitized materials are purchased under definite quantity contracts providing for delivery as called for. Consequently, depots make every effort to avoid excess stocks, to ensure that film issued is of recent manufacture. The manufacturers place on each carton an "expiration date," which merely indicates that after the passage of that date the manufacturer will not guarantee the material. The film is shipped to overseas theaters usually nine to eleven months prior to this expiration date, in order that theaters may receive film in the best possible condition and of adequate quality for diagnostic purposes. It is essential, therefore, that supply personnel in the theaters store and ship the film under conditions which will protect it prior to use.

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### LAUNDRY DAMP BOXES

Damp boxes used in the pressing department of Army hospital laundries should be constructed with slat or screen bottoms. All laundry should be removed from them at the close of business each work day to permit the free circulation of air and allow thorough drying of the interior of the container during the hours when the laundry is not in operation. This will also prevent the formation of mildew and subsequent damage to the fabric.

### PACKING OF ALCOHOL AND WHISKEY

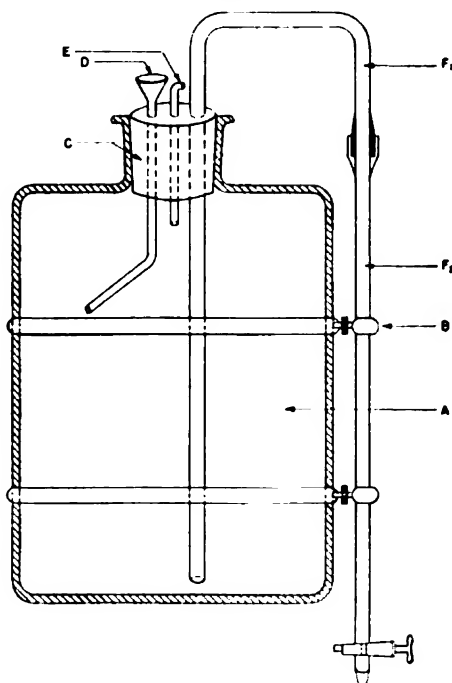
Few Medical Department items have been more subject to breakage in shipment than whiskey and ethyl alcohol, a difficulty caused by the fragility of glass containers and by the attractiveness of the contents. Packing specifications for these items have recently been revised. In the processing of whiskey and ethyl alcohol for overseas shipment, each bottle now is to be examined to ensure that the cap or cork effects a tight closure and that this closure is additionally secured by a cellulose band or hood. The corrugated board carton and partitions are inspected to determine that they hold the bottles firmly to prevent lateral and vertical motion. All void spaces between bottles and cell walls are filled with clean granulated cork, care being taken that each bottle rests on a padding of cork. The carton is then placed in a nailed wooden shipping box, which has been lined with a sealed waterproof barrier, and the box is securely strapped. All identifying markings that specifically reveal the nature of the contents are omitted; only the Medical Department stock number identifies the items in the box. It is believed that these packing and marking specifications will reduce the breakage of whiskey and alcohol shipments.

### APPARATUS FOR DISPENSING CORROSIVE AGENTS

Laboratories which use large quantities of corrosive liquids, dispensing a few milliliters at a time, find need for a durable, efficient dispenser. Siphon-type dispensers having rubber connections and a metal clamp deteriorate rapidly because of the action of the corrosive agent.

An inexpensive, all-glass dispensing apparatus has been devised by a noncommissioned officer at Camp Maxey, Texas, where for two months, in constant use, it has proved highly satisfactory.

The six major parts are: A, a glass 4-liter bottle with a mouth of thick glass and a wide rim lip; B, two metal clamps attached by screw pivots to metal bands; C, rubber stopper, 3 holes, size No. 7; D, glass funnel with a long stem bent to a 45-degree angle. The bend directs the bubbles of air against the side of the bottle and prevents air pockets from forming in the burette-



type tube when the bottle is being refilled; *E*, a piece of glass tubing about 6 inches long to act as an outlet valve for air; *F-1*, glass tube with thick wall and a ground glass end which fits into the ground glass mouth of *F-2*, a thick-walled burette-type tube with a stopcock at the lower end.

This apparatus is not affected by corrosive agents, is inexpensive, and does not "freeze" or drip.

#### VETERAN WAR DOGS

Veteran war dogs, those no longer suitable for combat because of being over age and those not adaptable to scout duty, are being assigned to Army convalescent hospitals as pets and mascots for patients. If a hospitalized veteran soldier becomes attached to an individual dog, he may assume full ownership and take the dog home with him when he recovers and is released from the service. Dogs given to the hospitals are those whose donors do not wish them returned, cannot be located, or are willing to relinquish their claim to the dogs in favor of the convalescing soldiers. The dogs have undergone retraining by the Quartermaster Corps at its War Dog Training Center to remove undesirable or aggressive traits acquired by reason of former training or combat duty. Each veteran who acquires a dog is given instructions in the care and handling of dogs and furnished a copy of the War Department's Dog Training Manual.

#### THE IMPORTATION OF PETS

The adoption of pets and mascots by individuals or units overseas has been a common practice. Experience indicates that in many cases the owners of pets wish to bring them to the United States. While it is generally known there are civil restrictions on the importation of animals and birds, apparently it is not realized there are military restrictions on the transport of pets and mascots on Army conveyances. These restrictions on transportation are actually more stringent in effect than the civil requirements for entry. It is advisable for medical officers to become familiar with the military regulations so that owners of pets may be properly advised before unnecessary requests are written to Federal agencies in the United States.

The following summary of military and civil restrictions on the transportation and importation of animals and birds provides sufficient information for most cases. Further information is contained in sections VI and VIII, W.D. Circular No. 453, 1944. *Military restrictions.* The transport of pets, mascots, and birds of the parrot family on Army transports and other vessels allocated to the War Department is prohibited by the provisions of change 2, AR 55-485, 7 January 1944, the only exception being dogs used for military purposes. Transportation of pets across national boundaries on aircraft under Army



jurisdiction is also prohibited except for scientific, military, or educational purposes (AAF Regulation No. 61-3, 9 August 1944). *Civil restrictions.* Only in cases where transportation of pets is available on nonmilitary conveyance is it necessary to consider the civil requirements of the United States. Restrictions, usually for the protection of health of man or animals, have been established by various agencies. Selection of the proper agency to consult will depend on the type of pet to be imported. The following information will be helpful in reaching a decision.

*Parrots.* Parrots and birds of related species are a hazard to man because of the risk of transmission of psittacosis, and authorization to import must be obtained in advance from the U. S. Public Health Service, Bethesda, Maryland. Parrots must have been in the owner's possession for two years, and no more than three may be imported. Inspection will be performed at the time of entry. When the owner does not accompany the bird, quarantine for six months is required at the owner's expense. The owner or consignee must provide an experienced caretaker for whose lodging and subsistence the Public Health Service will make a charge of \$2.00 per day. The expense of quarantine should be considered seriously when nonmilitary transportation is used as it is unlikely that the owner will be able to accompany the bird. Connecticut, Florida, Maryland, Michigan, and New York prohibit the importation of psittacine birds, even though Federal requirements are met.

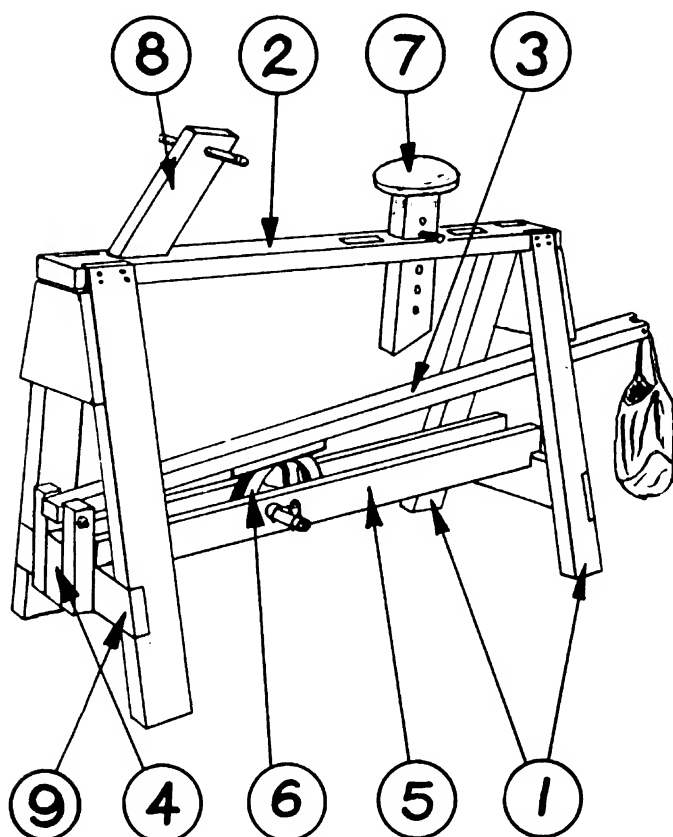
*Domestic animals.* Authorization to import most domestic animals must be obtained from the Bureau of Animal Industry, U. S. Department of Agriculture, Washington, D. C. However, contrary to general belief, the United States has no restrictions on the importation of dogs except that dogs intended for the care of livestock will be held at the border until laboratory examination rules out the presence of sheep tapeworm. Prior authorization to import a dog is not necessary. This is not true in the Territory of Hawaii where quarantine of pets liable to rabies is enforced for 120 days at the owner's expense. The importation of wild ruminants (sheep, goats, deer, antelopes) and swine is also controlled by the Bureau of Animal Industry.

*Wild animals and birds.* Importation of all wild animals and birds except ruminants, swine, and psittacine birds must be authorized by the Fish and Wildlife Service, U. S. Department of the Interior, Chicago 54, Illinois, before entry will be permitted. Importation of the mongoose and certain birds injurious to agriculture (English sparrow and starling) is prohibited.

It is suggested that an individual in military service, when applying to a civil agency for authorization to import an animal or bird, signify knowledge of pertinent military restrictions and describe available transportation facilities.

## EXERCISING BICYCLE

The 32d Station Hospital in Italy filled its need for an exercising bicycle with the improvised device illustrated here. The material required for its construction included:



(1) Four pieces of lumber, 2 by 4 by 36 inches. (2) One piece of lumber, 2 by 8 by 48 inches. (3) One piece of lumber, 2 by 4 by 54 inches, two  $4\frac{1}{2}$ -inch bolts (one  $\frac{3}{8}$  and one  $\frac{1}{4}$  inch thick), and one piece of steel plate  $\frac{1}{4}$  by 6 by 6 inches. A bag with weights hangs from one end of this part of the apparatus. The pin is removable, so the bag may be removed as desired. (4) One block of wood, 2 by 4 by 6 inches, plus two pieces of lumber, 1 by 2 by

10 inches. (5) Two pieces of lumber, 2 by 4 by 48 inches. (6) One 8-inch pulley wheel; one piece of piping, 7 inches long; two pieces, 6 inches long; and four 45-degree elbows and two pipe couplings. (7) One piece of  $\frac{1}{2}$ -inch piping, 8 inches long; one piece of lumber, 2 by 4 by 11 inches; and one board, 1 by 6 by 7 inches. (8) One piece of lumber, 2 by 4 by 12 inches; plus one piece of lumber, 9 inches long and 1 inch thick, rounded. (9) Two pieces of lumber, 2 by 4 by 28 inches.

## A WHIRLPOOL DEVICE

The septic surgery section of the Post Hospital, Fort Sill, Oklahoma, uses a simple whirlpool device, consisting of a rubber tube,  $\frac{1}{2}$  inch in diameter (Med. Dept. Item No. 3879000), which may be plugged into any mixer-type water faucet, and is long enough to circle about one-half the circumference of the sink or washbasin. Captain Joseph Reiter, M.C., reports that by plugging the distal end and cutting holes in the tub-

ing and adjusting the outflow to a suitable pressure and temperature a satisfactory whirlpool will result. The tubing may be weighted at intervals to eliminate any thrashing about as the water pressure is raised. The outlet plug of sink or washbasin may be enlarged so that continuous drainage may occur and circulation be obtained. The tubing may be removed from the faucet if necessary. Satisfactory success has followed its use for extremity infections. The small latrine washbasin is especially good for hand infections of all types. The basin must be scrubbed with disinfectant following each treatment. A deep sink is used for infections of the foot and ankle.

With this device, the long trips to the physiotherapy section previously required have become unnecessary. A plan may be worked out for a similar setup in each dispensary.

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#### THE MEDICS ON D-DAY

Medics invaded the Normandy peninsula alongside the fighting men on 6 June 1944. Medics jumped with the paratroopers and stormed ashore with the infantry. Wherever a fighting man was wounded, an aid man soon was at his side, distinguishable only by his red cross and lack of weapons.

Airborne Surgical Team No. 1, Third Surgical Group, at H-hour minus 3, glided to crash landings with the 101st Airborne seven miles inland from the French coast. Under heavy fire from the outset, the team administered twenty-five blood transfusions to crash casualties from on-the-spot donors. About one hundred casualties were treated before the seaborne invasion was launched. Airborne surgeons carried 200 pounds of medical equipment. Enlisted personnel brought additional supplies. Emergency treatment completed, the surgical team braved enemy fire to haul heavy equipment from wrecked gliders.

Following the troopers, this unit entered the Norman village of Hiesville and set up a hospital in a chateau. Surgery soon was being performed on three operating tables improvised from litters placed on boxes. Patients were blanketed with parachutes collected by two of the men. The team sustained only one casualty throughout the entire hazardous action. Captain Charles Margolies, Brooklyn, suffered a minor injury, then was evacuated three days later when he received a serious wound.

In achieving success in the first mission of its kind, this team established the value of similar operations for the future. By minimizing the time lag between injury and surgery, the loss of life was immeasurably curtailed. The success, although outstanding, was but typical of the work being done by similar groups.

On the beaches while D-day still was being calculated in H-hour plus minutes, sixteen teams of the Third Auxiliary

Surgical Group waded ashore under heavy enemy fire.—*The Story of the Medical Service—ETO* (Orientation Branch, Information and Education Division, ETOUSA).

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#### THE AMPHIBIOUS BOX

The Medical Department's amphibious box has proved to be a highly practical container of medical supplies and equipment in field installations. About the size of the plain field chest, it is made of  $\frac{3}{8}$ -inch plywood and bound by sheet steel. Waterproof rubber gaskets at the top and bottom of the box ensure a tight closure, and rubber shock gaskets at each corner prevent damage when the box is dropped. The bottom, which is attached by drive clamps, may be easily removed for the repair or replacement of the gasket. While in current models the top is attached by three hinges and is tightened by seven draw bolts, new specifications will eliminate the hinges and add three more draw bolts, so the top may be as easily removed as the bottom. The box is highly resistant to breakage and is waterproof even when submerged.

This amphibious box has been invaluable in the functional packing of field installations. Supplies and equipment may be quickly repacked when the unit moves. While the unit is in operation, the tops may be removed and the boxes stacked on their sides, thus providing tiers of shelves for the storage and issue of the supplies. It is to facilitate this latest use that the hinges are now being replaced by draw bolts.



Hospital corpsmen help a wounded U. S. Army paratrooper aboard an LCVF which will take him to a hospital ship bound for England. June 1944. U. S. Navy photograph.

**THE SUPPLY AND FINANCE VOLUME IN THE  
MEDICAL DEPARTMENT HISTORY**

The projected history of the Medical Department during World War II will include a complete volume devoted to medical supply and finances. This volume will begin with an account of procurement planning, the preparation of specifications and tables of equipment, the accumulation of war reserves, and other steps by means of which the Medical Department prepared for the supply responsibilities entailed by war. Then the story of the procurement, storage, and distribution of medical supplies for the period of the war will be related. The entire supply function of the Medical Department, both in the zone of the interior and overseas, will be broken down into its various parts; and each will be described as a step in the accomplishment of the whole. The volume will tell the story of medical supplies in an arrangement corresponding to the physical movement of the supplies: purchase, inspection, payment, storage, distribution to zone-of-interior installations, shipments to ports, requisitions from theaters of operations, shipments overseas, and the distribution of the supplies to the various using installations in the communications and combat zones. Thus the medical service will have an authentic record of the manner in which supply officers have launched and managed this vast program of providing medical supplies for an unprecedentedly large army and its allies.

Source materials for the domestic phases of this history are abundant. They are sought for and found in the reports, records, and correspondence of the Supply Service and Fiscal Division; in the reports received from posts, camps, and stations; in the records of the medical depots and ports of embarkation. In addition, four depots are writing their own histories, largely for enlightenment of the medical supply historian, and the Army Medical Purchasing Office is assembling important information on the history of procurement.

Annual and special reports from overseas have provided information on the distribution of medical supplies to the fighting fronts. For example, the Medical Supply Division of the Chief Surgeon's Office, E.T.O., has prepared a voluminous report on the receipt, storage, and distribution of medical supplies and equipment during 1944. This report enables the historian to trace, on the theater headquarters level, the careful preparations which were made for the Normandy landings and the huge volume of medical supplies which were conveyed to the assault forces on the far shore. In the reports of division surgeons, field hospitals, medical depot companies, and other installations which provided or used medical supplies, the historian finds information which contributes much to the completeness of the story. These reports reveal the down-to-earth problems which confronted supply officers in an active the-

ater—medical supplies unloaded on the beaches at low tide and covered with water a few hours later when the tide came in, inadequate transportation with which to move supplies from dumps to medical depots, or lack of covered storage space for the protection of supplies from the elements.

These challenging problems found their solutions in the American soldier's flair for improvisation. When a medical supply unit needed more transportation, it volunteered to deliver replacement trucks to Ordnance depots on the condition that the trucks first be filled with medical supplies. To the rear of hospital trains, making their way to forward areas, were attached boxcars piled high with supplies and equipment. Airplanes and, on one occasion, even artillery shells were used to convey critically needed medical supplies to combat units surrounded by the enemy.

While it is quite probable that the distribution of medical supplies in the Pacific theaters has been characterized by this same combination of determination and ingenuity, reports from that area have not been as detailed as those prepared in E.T.O. When reports are written describing the Philippine and Okinawa campaigns, it is hoped that this deficiency will be remedied.

On the basis of historical material already collected, it can be said that the supply and finance volume in the Medical Department history will tell a story of splendid achievements which are not lacking in drama.

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#### USE OF DEHYDRATED MEDIA FOR BLOOD AGAR PLATES

Dehydrated media are used for the preparation of blood agar plates in the majority of Army laboratories. According to recent reports from overseas installations, these media have shown deficiencies which, in general, were of two types: the medium turns brown on incubation, particularly after storage for one or two days or more in the icebox; beta hemolytic streptococci, pneumococci, and influenza bacilli grow poorly or not at all.

A similar difficulty was presented in 1942, at which time steps were taken to improve the quality of dehydrated media. As a result of a service evaluation, tryptose was added to standard Item No. 1106550, Blood agar base. Blood plates made from this medium readily sustained growth of the fastidious respiratory pathogens. All blood agar base purchased since this date has been prepared according to the modified formula. It is possible, however, that stocks of Item No. 1106550, purchased prior to 1942, may have been supplied to some installations. Current issues of this medium are clearly labeled "Tryptose Blood Agar Base." Old stocks should not be destroyed but may be employed in the preparation of media used for organisms with simple growth requirements—e.g., *Salmonella*, *Proteus*.

# REHABILITATION OF THE GERMAN HEALTH SERVICES

Rehabilitation of the German health services has been recognized as one of the large problems confronting military government in Germany. It is essential that an adequate public health system be developed quickly, as serious epidemics would be hazardous to the occupying forces and to the health of Europe and would render more difficult the stabilization of German economy.

To meet this problem, a Public Health and Welfare Division has been organized as one of the major divisions of the



Zones of occupation by the Allied powers in Germany. The Bremen area, or enclave, is administered by the United States, and the Berlin area, or enclave, is administered by the four Allied powers. The headquarters of the United States zone of occupation is at Frankfurt.

U. S. Group, Control Council, with Major General Morrison C. Stayer, formerly surgeon of the Mediterranean Theater, as chief of this division. General Stayer is assisted by three deputies, one each for public health, public assistance, and education and religious affairs. A strong staff of medical officers with experience in civil affairs in western Europe and in Italy is being assembled for the Public Health Branch of the Public Health and Welfare Division. In addition, a group of civilians, highly qualified professional specialists in various fields, is being sent to Germany as special advisors to General



Stayer. This staff, military and civilian, will formulate policies for the control of German medical and health affairs within the U. S. zone (see map), in accordance with the over-all policy for the military government of Germany, and will negotiate with the British, Russians, and French to develop a uniform health policy and to ensure its uniform application throughout all of occupied Germany.

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#### TUBERCULOSIS IN GERMAN PRISON CAMPS

A high incidence of tuberculosis was discovered in military and civilian prisoners of Allied and other European nations, who were liberated by the United States Army in western Germany shortly before the end of the war in Europe. The prevalence was so great as to suggest a grave spread of tuberculosis as a result of the conditions of imprisonment. A precise determination of the incidence of tuberculosis in prisoner groups is impossible, however, because of the manner in which the ill became concentrated. When the Germans retreated, they took able-bodied military prisoners with them, leaving behind hospitalized prisoners and various other non-effectives. Repeatedly, whole hospitals with large numbers of sick Russian, Polish, Yugoslav, and Italian former soldiers fell to the care of our Army. A high percentage of these hospitalized prisoners proved to be tuberculous.

The Chief Surgeon of the European Theater of Operations designated several American general hospitals to take care of recovered Allied military prisoners, in the early phase of operations in Western Germany, before more lasting arrangements could be established in Germany. Almost all general hospitals in the theater, however, ultimately received a few of these recovered prisoners, as a result of the exigencies of rapid evacuation from front-line hospitals. One large general hospital was ultimately devoted almost entirely to their care. The treatment given, while temporary, pending repatriation of the recovered prisoners to their own countries, was excellent. An important part of it was educational, with the aim of indoctrination of the danger of dissemination of the disease. No comparable incidence of tuberculosis was discovered in recovered American prisoners of war.

The incidence of tuberculosis in the concentration camps which housed civilian prisoners was also very high. At the notorious Buchenwald camp, for example, near Weimar, Germany, large numbers of tuberculous patients were found under treatment at the time of the camp's liberation. A medical service, operated by prisoner physicians, had been established long before the liberation, and, after the camp was freed, this organization was much improved under U. S. military supervision. General case-finding facilities were highly



limited, however, and all physicians agreed that unrecognized cases abounded in the camp.

The conditions of existence in these camps were favorable, in every way, to the development and spread of tuberculosis. The combination of crowding, malnutrition, and harsh treatment furnished an ideal medium for its propagation. Prisoners were herded in close quarters in insanitary barracks, and the spread of tuberculosis by direct contact must have been extremely frequent. Malnourishment characterized all of these camps and had a far-reaching effect on resistance to all disease. Medical records for the camps are fragmentary and a breakdown of the causes of death cannot now be made. The trend of mortality after the liberation, however, was such as to indicate that tuberculosis was one of the chief causes of death. It is reasonable to believe that a large proportion of the hundreds of bodies found awaiting cremation in these camps on their liberation, now familiar through press photographs of the camps, represented deaths from tuberculosis. At Buchenwald, the 45th Evacuation Hospital, operating under a plan laid down by the Surgeon of the First Army, evacuated about 500 tuberculous patients for care shortly after the liberation. The manner in which this operation was conducted was superb. The gratitude of the patients themselves was extreme, and the efficiency with which the evacuation was made and care established drew the highest tribute from a number of distinguished foreign physicians who were inmates of the camp.

The Nazi concentration camps created a grave source of dissemination of tuberculosis in Europe. Disease contracted there, and now in its incipency, may be expected to develop for months or years after the general repatriation, which is now well under way. The recognition and control of tuberculosis in men returning from these concentration camps will be a problem for the health officers of every country whose nationals were imprisoned.

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#### DISTRIBUTION OF RADIO-RECORD PLAYERS

One hundred radio-record player combinations, recently contributed by the Loyal Order of the Moose to the Medical Department, are being distributed to Army hospitals throughout the United States. Shipment of instruments began in August, and it is expected that the total number will have been distributed shortly after 1 October. They are being shipped to the following types of installations: hospital centers, general hospitals, A.S.F. convalescent hospitals, A.S.F. regional station hospitals, A.A.F. convalescent hospitals, and A.A.F. regional station hospitals.

The generous offer to make this contribution was accepted by the Central Hospital Fund some time ago, but production and delivery have been delayed by the difficulty of obtaining materials and component parts. Through the War Production Board, the Supply Service made priority arrangements which enabled the manufacturer to procure the required parts. With the cooperation of the Legal Division, assistance was also furnished the Loyal Order of the Moose in obtaining an exemption from the excise tax.

### NEUROLOGICAL CENTERS

Complex neurological diagnostic problems are constantly being encountered at the Army hospitals. Of the named general hospitals nineteen have been designated as neurological centers to provide expert care for patients. The Assistant Surgeon General's letter establishing the neurosurgical centers reads in part as follows:

"Use of neurological personnel. Trained neurologists have been placed in all neurosurgical centers and their number will be increased. The best traditions of this professional group assure their ability to be of vast aid to the military neurosurgeon. Neurologists are to be regarded as consultants to surgery and not assigned to that section. Cooperation between neurosurgeon and neurologist is mandatory.

"Screening of neurosurgical patients. Neurosurgical admissions should be reserved as far as practical to those patients needing surgical intervention in the treatment of their disabilities. For example, patients with closed head injuries, with convulsive states, with obscure diagnostic problems at all, should be studied on neurological section.

"Diagnostic procedures. The services of the neurological section should be used to the fullest in carrying out diagnostic measures as described in War Department Technical Bulletins Nos. 74 and 76, including encephalography, electroencephalography, diagnostic lumbar puncture, dermometry, and other electrical diagnostic methods not applied by the physiotherapy section.

Aphasic language disorders are being seen with relative frequency in the specialized general hospitals caring for neurological and neurosurgical patients. In the great majority of these patients the aphasia has resulted from severe head injury encountered in combat. Aphasia also occurs in the wake of vascular accidents, inflammatory disease, or upon removal of a tumor of the brain. Although improvement tends to occur spontaneously, much can be done in speeding the progress and in directing improvement through speech training. Further, much can be done to influence the individual's psychological reaction to his speech defect by skilled management of the language disorder. This care should be given early in the patient's rehabilitation. Therefore, speech centers have been established at most of the neurological centers. This work has required well-trained personnel who are gradually becoming available in sufficient numbers so that the work can be adequately carried on. This subject is presented in detail in TB MED 155, dated April 1945.

Through the establishment of neurological and neurosurgical centers the best of care in this specialty is being provided. It is to be hoped that similar neurological centers may be designated overseas for the diagnosis and management of neurological problems.

### RECENT DIRECTIVES AND PUBLICATIONS

This list is intended as only a brief reference to the items mentioned. Before acting on any of them, the original communication should be read, and requests for copies, when made, should be directed to the source of the communication through proper channels.

- AR 605-12  
C 2  
23 May 45  
Promotion. Changes par. 4, AR 605-12, 17 Aug. 1944. Officers below grade of colonel returned to U. S. military control who were interneers, missing in action, or prisoners of war, and who presumably would have been promoted but for internment or capture, will be considered for immediate one-grade promotion.
- WD Circular No. 165  
5 June 45  
Sect. II  
Combat Film Bulletins. All combat film bulletins will be previewed by a medical officer at each hospital in order to determine which patients should be prevented from seeing them and what audience selection measures should be instituted.
- WD Circular No. 150  
22 May 45  
Sect. VII  
Publications. All obsolete or unserviceable restricted publications and blank forms will be salvaged in any manner which will render such material illegible and unfit for use other than as waste paper.
- ASF, Headquarters  
Circular No. 193  
30 May 45  
Part III, Sect. VIII  
Reassignment. Prescribes procedures for reporting officers available for reassignment. Chiefs of technical services to submit reports showing estimated number of officers available for reassignment in all categories (replacements, rotational, readjustment, etc.). Reports to be submitted monthly for six months to Military Personnel Division, Hdqrs., A.S.F. First report due 24 June 1945.
- WD Circular No. 157  
30 May 45  
Sect. III  
Identification Badge. Each W.D. agency responsible for issuance of credentials will assure that proper accountability records of credentials are maintained, and, on termination of service of each individual, will ensure that credentials are surrendered.
- WD Circular No. 160  
1 June 45  
Sect. V  
Sulfonamide Therapy. Discontinues practice of routine local application of crystalline sulfonamides to wounds. Local application to wounds not involving serous cavities following wound surgery will also be discontinued.
- WD Circular No. 170  
8 June 45  
Hospital, Convalescent. Personnel table presents number of personnel considered adequate for operations of average type hospital which is operating at normal capacity. Provides that hospital commanding officers are responsible for making every effort to decrease number of personnel required to man individual medical installations.
- ASF, Headquarters  
Circular No. 219  
13 June 45  
Part II, Sect. III  
Occupational therapy departments to be established in ZI general and convalescent hospitals. One occupational therapist to be assigned per 250 beds. Sets forth function of The Surgeon General in connection with procurement and assignment of occupational therapists.
- WD Circular No. 181  
19 June 45  
Sect. I  
Officers. Sets forth policies governing disposition of officers who have reached or will reach the statutory age for retirement.
- WD Circular No. 186  
21 June 45  
Sect. I  
American Red Cross. Army Hospitals. Sets forth detailed instructions governing relationship between A.R.C. and Army personnel in Army hospitals. A.R.C. responsible for planning and directing medically approved recreation for patients in voluntary off-duty activities which are not a part of the required reconditioning or convalescent program.

### THE MEDICAL BADGE AND ADDITIONAL PAY

Enlisted men entitled to wear the Medical Badge (*The Bulletin*, May 1945, page 20) will receive ten dollars a month additional pay under the act of 6 July 1945 and W.D. Circular No. 229, 28 July 1945. While the Medical Badge itself may be awarded retroactively to those qualified on or after 7 December 1941, the additional pay is provided effective on or after 1 August 1945 and covering the period of the present war and six months thereafter. The provisions for additional pay are not retroactive prior to the date of the order announcing the award of the Medical Badge, or from 1 August for those previously awarded the badge. Temporary suspension of the right to wear the Medical Badge will not affect payment of the extra compensation, provided that the suspension was not for failure to perform duties satisfactorily under actual combat conditions, for being A.W.O.L., for sickness not in line of duty, or when the medical soldier is entitled to expert infantry or combat infantry badge pay or aviation pay.

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### AWARD OF THE BRONZE STAR MEDAL

The War Department has announced the award of the Bronze Star Medal to the following Medical Department personnel:

Master Sergeant Ermon R. Addington, Harrison, Idaho.  
Staff Sergeant William H. Lambert, Fort Myers, Florida.  
Staff Sergeant Frederick Rabin, Long Beach, California.  
Technician Third Grade George W. Miller, of Ellensburg, Washington.  
Sergeant Carl E. Stuart, of Walthill, Nebraska.  
Corporal Benjamin Cabreira, Fresno, California.  
Corporal Charles C. Jensen, Chicago.  
Corporal Edward Johnson, Chicago.  
Corporal Harlan L. Rex, of Mt. Vernon, Ohio.  
Technician Fifth Grade Argil F. Coffman, of Parkersburg, West Virginia.  
Technician Fifth Grade Albin A. Gorecki, Deep River, Connecticut.  
Technician Fifth Grade Charles D. Montgomery, of Junction, Texas.  
Technician Fifth Grade Luke W. Parmelee, of Lincoln, Vermont.  
Technician Fifth Grade Joseph J. Sandor, of Garfield Heights, Ohio.  
Technician Fifth Grade Marshall F. True, of Quincy, Illinois.  
Technician Fifth Grade Roy T. Winkler, of Roswell, Georgia.  
Private First Class Carl Burns, of Brushart, Kentucky.  
Private First Class Walter A. Gelski, of Brookfield, Missouri (also awarded Oak-Leaf Cluster to the Bronze Star Medal).  
Private First Class John T. Robards, of Evansville, Indiana.  
Private First Class George E. Rowe, of Tavenner, Michigan.  
Private Paul M. Sadler, of Oakmont, Pennsylvania.  
Private First Class Alfred J. Vaccacio, of Brooklyn, New York.  
Private First Class James T. Walters, of Loretto, Tennessee.  
Private Rodney Key, of Henryetta, Oklahoma.  
Private Joseph P. Maher, posthumous.  
Private Kenneth O. Spurgeon, of Abilene, Texas.  
Private Joseph J. Zetti, of Clarksville, Pennsylvania.

### AWARD OF SOLDIER'S MEDAL

The War Department has announced the award of the Soldier's Medal to the following Medical Department personnel:

Captain Alfred A. Dolgin, D.C.  
Captain Maurice S. Raben, M.C., of Port Chester, New York.  
Captain Mitchell Sack, D.C.  
Captain Charles B. Skinner, M.C., posthumous.  
Technician Fourth Grade John J. Sullivan, Malden Massachusetts.  
Technician Fifth Grade Loyd E. Adams, Fort Stockton, Texas.  
Technician Fifth Grade Anthony L. Ausetts, of Barberton, Ohio.  
Technician Fifth Grade Paul G. Hutson, of Baltimore, Maryland.  
Private First Class Reynold A. Barbetti, of Bronx, New York.  
Private Wesley H. Byrne, of Duncan, Oklahoma.  
Private First Class Robert M. Koenig, of Brooklyn, New York.

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### AWARD OF THE LEGION OF MERIT

The War Department has announced the award of the Legion of Merit to the following Medical Department personnel:

Brigadier General James E. Baylis, U.S. Army, Cincinnati, Ohio.  
Colonel Benjamin M. Baker, M.C., of Baltimore, Maryland.  
Colonel Otis O. Benson, Jr., M.C., of Tower, Minnesota.  
Colonel Robert S. Brua, M.C., of Los Angeles, California.  
Colonel Albert R. Dreisbach, M.C., of Washington, D. C.  
Colonel Alfred A. de Lorimier, M.C. (then major), Fort Benton, Montana.  
Colonel Frederick J. Frese, M.C., of Yonkers, New York.  
Colonel Silas B. Hays, M.C., of Washington, D. C.  
Colonel Anthony J. Lanza, M.C., of New York City.  
Colonel Alfonso M. Libasci, M.C., of Brooklyn, New York.  
Colonel Karl R. Lundeberg, M.C., of Washington, D. C.  
Colonel Ashley W. Oughterson, M.C., of New Haven, Connecticut.  
Colonel Cornelius Packard Rhoads, M.C., of New York City.  
Colonel Clell B. Perkins, V.C., of Johnstown, Ohio.  
Lieut. Colonel Richard L. Meiling, M.C., of Columbus, Ohio.  
Lieut. Colonel Dan B. Searcy, M.C., Shreveport, Louisiana.  
Major Joseph A. Calamari, Sn.C., of New York City.  
Major Gordon H. Haggard, M.C., of Indianapolis, Indiana.  
Major John S. Haley, V.C., A.U.S.  
Major Raymond J. Hodapp, D.C.  
Major James H. Grammer, M.C., of Bryan, Texas.  
Captain Richard E. Barnes, D.C., of Shaker Heights, Ohio.  
Captain Lemuel Bowden, M.C., of Wilmington, Delaware.  
Captain Reuben T. Crawford, D.C., of Fayetteville, Tennessee.  
Captain David Solomon Gordon, D.C.  
Captain Saul Greizman, M.C., of Pittsburgh, Pennsylvania.  
Captain Edward J. Kotab, D.C.  
Captain Weldon T. Ross, M. C., of McMinnville, Oregon.  
Captain Lloyd W. Taylor, M.C., of San Francisco, California.  
Captain Alfred T. Wells, Sn.C., of Southbridge, Massachusetts.  
Second Lieutenant Ernest S. Prange, M.A.C. (then staff sergeant, Medical Department), of San Antonio, Texas.  
Warrant Officer (jr. gr.) Gilbert B. Wiseman, of Holdenville, Oklahoma.

## Clinical Observations on Early Trench Foot

MAJOR CHARLES A. RAGAN

Medical Corps, Army of the United States  
and

CAPTAIN ADOLPH E. SCHECTER

Medical Corps, Army of the United States

Trench foot, which has been observed in large numbers of patients in this war, was observed also in World War I. It is considered to be a vascular injury due to cold. Wetness is a contributing factor, also, because of the attendant heat loss. The Italian Campaign lasted through two winters. In the winter of 1943-1944, large numbers of cases of trench foot were seen. In the winter of 1944-1945, trench foot was a much less serious problem. Both the number of cases and the severity of the type of trench foot diminished, while the incidence of amputation for trench foot fell close to the vanishing point. While numerous factors serve as variables when one compares the two winters, the three most important ones seem to be: (1) The use of shoe pacs in the second winter rather than shoes and leggings or combat boots. (2) The difference in the tactical situation. In the first winter, the campaign was active, exposure was severe, and prompt evacuation was not always possible. In the second winter, the front was static, troops were not kept on outpost for overlong periods, exposure was brief, and evacuation was prompt when symptoms appeared. (3) The increased awareness of the line officer that strict foot discipline is essential.

The bulk of the work done on trench foot has consisted of clinical descriptions of the later stages of the injury. At this hospital, patients are received directly from clearing stations and the opportunity was presented to us to see the early picture. In the hope that a careful study of the early stages of trench foot might help in understanding the pathogenesis of the injury, a program was begun in January 1945. These patients were admitted to a separate ward and were examined by one of us immediately on admission. A complete history was taken, which stressed certain points, and the physical examination included a detailed description of the feet. The group studied was small and, in a sense, a selected one, in that patients presenting gangrene, deep ulceration, or extensive blisters were evacuated to the base without detailed study. Certain clinical observations will be presented.

TABLE I  
*Symptoms of early trench foot*

Duration of symptoms	2-30 days; median 5 days
Subjective complaints	
Numbness	present 19 absent 5
Coldness	present 22 absent 2
Pain at rest	present 18 absent 6
Pain at work	present 22 absent 2
Paresthesias	present 18 absent 6
Objective complaints	
Swelling	present 20 absent 4
Redness	present 16 absent 6 negroid 2
Lesions	absent 18 blisters 6
Past history of trench foot	present 6 absent 18

CLINICAL PICTURE OF  
EARLY TRENCH FOOT

Table I shows the results of the history. The duration of symptoms was brief in most cases, with a median duration of five days. The symptoms present most commonly were coldness, pain at work (this usually meant walking), and swelling. Numbness, pain at rest, and paresthesias were also present but somewhat less frequently. Six of the 24 patients had a history of previous trench foot.

Table II shows the result of the examination of the feet. The color varied from dusky red to pallid, and depended on the state of vasodilatation of the

feet. The temperature change, as well, varied with the state of dilatation; but on admission, a sharp line of demarcation of skin temperature from warm to cold was noted, usually at the level of the boot tops.

PREDISPOSITION

Predisposition in a given individual to trench foot is a question which has not been fully answered. In the history on admission, factors which might indicate a constitutional tendency were stressed. This is outlined in table III. A history of undue sensitivity, in civilian life, of the extremities to cold was not found in a significant number. The consumption of tobacco in this group was not excessive when compared to that of the average soldier. No constant tendency to a family history of hypertension or peripheral

TABLE II  
*Physical examination on admission*

Color	negroid	2
	pink	4
	red	8
	pallid	8
	toes reddened	6
Temperature change	none	6
	toe tips	5
	boot tops	13
Sensory change	anesthesia	2
	hypesthesia	11
	anesthesia and hypesthesia	4
	hyperesthesia	3
	hyperesthesia and hypesthesia	4
Pulses in feet	absent	2
	present reduced	10
	present normal volume	12
Edema	none	7
	slight	16
	marked	1
Sweating	absent	12
	slight	10
	marked	2



vascular disease was found. On physical examination on admission, in no case was the blood pressure over 140 systolic or 90 diastolic. Ten patients were subjected to the cold pressor test as described by Hines and Brown.<sup>1</sup> The results were negative in 8, equivocal in 1, and positive in 1.

#### EVIDENCE OF DAMAGE TO NERVES

These patients were usually seen promptly after entering medical channels. In a few cases, the patient had been retained at an aid or clearing station from one to three days because of some question in diagnosis. The majority, however, were seen at this hospital four to twelve hours after reporting on sick call. A striking feature of the physical examination on admission was the presence of marked sensory changes in the feet, consisting of varying degrees

TABLE III  
*Factors concerned in predisposition to trench foot*

Consumption of tobacco (number of cigarettes daily)	none less than 10 20 40	4 7 11 2
Family history of hypertension, peripheral vascular disease, or cardiac complaints	none present	15 9
Undue sensitivity to cold on exposure in civilian life	none moderate severe	10 13 1

of anesthesia or hypesthesia to pinprick. This loss of sensation was most commonly of the stocking type, ending at the level of the top of the shoe or boot. In general, the severe cases showed more extensive anesthesia than did the milder cases, in which the sensory loss embraced only the toes. As early as twenty-four hours after these changes in sensation had been charted, the pattern became confused and consisted of patchy areas of hyperesthesia, hypesthesia, and anesthesia which were impossible to chart. This occurred whether or not reflex vasodilatation had taken place in the feet. There were no changes in the deep tendon reflexes. Vibratory sense in general did not follow a pattern similar to the diminution in pinprick sensation, but in certain patients was absent from the toes and the malleoli.

#### EVIDENCE OF DAMAGE TO BLOOD VESSELS

The feet, on admission, were usually cold but occasionally were hot and slightly swollen. The patients were kept in bed with the feet exposed to the ward tent temperature, which was far from constant, fluctuating as much as 10° C. in a period of twenty-four hours. Usually, on this regimen, the feet became cool and remained so for several days. Thereafter, the temperature of the feet was completely unpredictable. At times, for no reason known to us, one foot would become hot and painful while the other remained cool.

In a general way, on admission, pulsation of the large vessels—dorsalis pedis and posterior tibial—was reduced or

1. Hines, E. A., Jr., and Brown, G. E.: Cold Pressor Test for Measuring Reactability of Blood Pressure; Data Concerning 571 Normal and Hypertensive Subjects, *Am. Heart J.*, 11:1-9, Jan. 1936.

absent when the feet were cold, and was full and bounding when the feet were hot. The nail-bed capillaries of the feet were examined in all patients. In a few it was not possible to visualize these vessels because of the overhanging cuticle. No abnormality was noted in the capillaries seen. The capillaries were fine, not bulbous or tortuous, and when the foot was cold were not too readily visualized. However, in every patient with trench foot who was examined when the patient was warmed, the capillaries were seen and appeared to be morphologically normal. The number of capillaries patent seemed, roughly, to be similar to that seen in the feet of normal persons examined under similar conditions.

Reflex vasodilatation was induced in 4 patients by giving whisky by mouth, and in 4 patients by intravenous ethyl alcohol (40 cc. in 1,000 cc. N saline). In all eight, vasodilation was readily induced. A thermopile for measuring skin temperature was available for a short time and Landis tests were done on 4 patients. In 2, maximal reflex vasodilatation was induced within thirty minutes. In the other 2, maximal reflex vasodilatation of the feet occurred only after the body had been warmed for one hour.

The phenomenon of "ischemic pain" has been described in a separate report.<sup>2</sup> The mechanism of its production is not clear. The pain is similar in character to that seen in intermittent claudication and should indicate a diminished blood supply to the part. This diminution in blood supply could be due to the increased tone of the sympathetic vasoconstrictor fibers as well as to the actual decrease in size of the vascular bed.

#### EVIDENCE OF DAMAGE TO MUSCLES

This group, studied for a short time, is composed of relatively mild cases, and it is not surprising that while under observation here no evidence of muscular atrophy was apparent. However, atrophy of the muscles of the plantar surface of the foot is a common finding in the later stages and in the more severe cases. Two patients presented an unusual picture. One was admitted with moderately severe trench foot. Fourteen days after admission it was noted that all toes of the right foot including the great toe were held firmly in dorsiflexion. The contraction was firm and could be overcome only by considerable force. In the bed next to him was a patient who also had moderately severe trench foot on admission. Fourteen days after admission (one day after the other patient developed the contracture) a similar dorsiflexion of the toes of the right foot was noted, but the great toe was not involved. The first patient stated that as a civilian his feet had been frozen four years before induction and he had then had a similar contracture in the foot. The implication was that the phenomenon was a hysterical one since it appeared in patients

2. Schecter, A. E., and Ragan, C. A.: Trench Foot: The Diagnostic Value of "Ischemic Pain," Bull. U. S. Army M. Dept., 89:98-100, June 1945.

in neighboring beds, in one of whom it had previously occurred. However, the contracture was maintained so firmly throughout the day that it seemed doubtful that it was solely on a hysterical basis. That night, both patients were given heavy sedation and when both were firmly asleep, the contractures were examined and found to be still present. The following day both patients were given ether anesthesia and relaxation of the contracture in each was complete. Novocain was injected into the belly of the extensor hallucis longus of the first patient and the distal phalanx of the great toe relaxed, but the proximal phalanx remained in dorsiflexion. As a corollary to this observation, in both of these patients a similar dorsiflexion in the opposite foot—in each, the left—could be induced by occlusion of the circulation by a blood-pressure cuff around



FIGURE 1. Dorsiflexion of the toes of both feet. Blood-pressure cuff about left thigh inflated to 220 mm. of mercury.

the thigh inflated above arterial pressure. This dorsiflexion returned to the normal position when the cuff was deflated. In a third patient a similar dorsiflexion was induced by vascular occlusion. When the first patient was under ether anesthesia, such a dorsiflexion could not be induced. He was kept under observation for ten days, and on evacuation the dorsiflexion of the toes of the right foot was still evident but the contracture was less firm. The second patient was observed for twenty-three days; at the time of transfer, the contracture

was still present but could be overcome readily by minimal pressure. The phenomenon in the left leg induced by vascular occlusion could no longer be elicited. In the third patient, dorsiflexion induced by vascular occlusion could not be induced forty-eight hours after it was originally observed. Figure 1 demonstrates the phenomenon.

#### DISCUSSION

The pathogenesis of trench foot is not clearly understood. The hypothesis commonly accepted is that cold leads to vasoconstriction with subsequent anoxia leading to damage of capillary endothelial walls and nerves. The damage to capillary walls permits transudation and the phenomenon of stranding of red cells leads to thromboses. Damage to a muscle presumably follows damage to nerve or blood vessel supplying

the muscle. The clinical observations reported here add very little evidence to this theory, either pro or con, and any evidence presented is extremely indirect. We feel there is no evidence to lead one to believe there is any constitutional predisposition to this injury but feel that it is purely a trauma induced by an external physical agent.

In this small group of mild cases, the evidence for permanent vascular damage is not too convincing. No demonstrable changes could be seen in the capillaries by direct visualization. Reflex vasodilatation could be induced in every patient in whom it was attempted. In some, the dilatation was not so prompt as one would expect in a patient with a normal vascular bed, but when finally induced it was maximal. When the feet were in dilatation, we were unable to convince ourselves that there was any appreciable reduction in the force of the large vessels which were readily palpable. The evidence that some temporary vascular damage is present is difficult to contradict. Edema is variable but can be induced in most patients by continued vasodilatation.

It seems clear that there is some damage to the nerve. The anesthesia, though temporary, is definite and is followed by changes which, although difficult to evaluate, are abnormal. Sweating, cold feet indicate overactivity of the sympathetics, if analogy of opposites may be used, since a dry, hot foot follows sympathectomy.

Sections of feet amputated for gangrene show definite thromboses, and one cannot readily explain the gangrene seen so frequently in the winter of 1943-44 on other than a thrombotic basis. However, one patient seen this winter throws some light on this. He was admitted to this hospital after having been kept at his regimental aid station for three days. While there he remained ambulatory and kept his shoes on. Although he had what we considered a very mild trench foot with anesthesia only of the toes and a slow onset of ischemic pain, he had definite gangrenous areas on several toes. This led us to speculate whether the gangrene seen in this injury might not be associated with pressure on skin traumatized by cold. As a further possibility it is suggested that the beneficial effects of shoe pacs may be related less to their water-repellent qualities than to their looseness. When shoe pacs are wet they do not shrink, whereas leather footwear shrinks when wet and leads to further pressure.

The observations reported cause us to question the commonly accepted theory of the pathogenesis of trench foot. The unusual activity of the vasoconstrictor and sweat gland stimulating fibers of the sympathetic nervous system and the time lag in certain cases in the development of maximal reflex vasodilatation lead us to assume that some damage has been done to this nerve tissue by the original trauma, either directly or as the result of anoxia. We have no evidence to show that throm-

bosis or permanent vascular damage has been caused by the trauma in these mild cases. All evidence we can produce points to no permanent structural damage to the blood vessels. The end result of these mild cases is similar, but in a lesser degree, to that seen in the more serious cases without amputation—a foot which is cold, sweating, and painful on walking. From the small number of patients we have seen with mild gangrene, it appears that the factor of pressure on skin traumatized by cold (similar to a trophic disturbance) is a real one.

Therefore, it is suggested as a working hypothesis for further investigation that the following chain of events takes place in the production of trench foot. Physical cold leads to vasoconstriction, which results in anoxia. Damage to the endothelial walls of the capillaries and to nerve tissue follows the anoxia. *The damage to the capillary endothelium is temporary.* The damaged nerve tissue recovers more slowly, so much so that some muscle atrophy results. The damage to the vasoconstrictor and sweat gland stimulating fibers is the last to be repaired.

#### SUMMARY

Since this article was written, a report<sup>3</sup> has come to our attention, describing the characteristic foot deformity seen in the later stages of trench foot.

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## Is Gas Gangrene a Misnomer?

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The entity known as "gas gangrene," first described by Fabricius in 1593, is probably too often presumed when the triad of crepitation, odor, and toxemia is discovered. A rapid devitalization of tissues plus an interruption of the chief vascular supply to the involved area are the two factors that predispose to the development of a gas infection. These prerequisites are often present in battle casualties. The regions of predilection are the back, buttocks, and the extremities, the latter especially when associated with compound fractures. The most common site is usually the upper third of the thighs. In civil life compound fractures resulting from road accidents account for the largest percentage of gas infections. The presence of both organic and inorganic foreign material within a wound add to the incidence of all types of infections including gas. Significantly, in civil life, gas infection superimposed on gangrene of the extremities is uncommon, probably, because of

3. Patterson, Russel H., and Anderson, Fred M.: War Casualties from Prolonged Exposure to Wet and Cold, Surg. Gyn Obst., 80:1-11, Jan. 1945.

the insidious nature of the gangrenous process and because the involved tissues are often completely covered by intact integument.

When gas infections occurs in war wounds associated with devitalized tissue plus marked vascular interruption, it usually appears within six to eighteen hours, but it may require up to three days. Absence of symptoms and signs after the third day is almost paramount to an escape from this type of gas infection. However, when gas infection appears in wounds associated with moderately devitalized or necrotic tissue alone, a condition known as "gas cellulitis" results, and this characteristically manifests itself not earlier than the third or fourth day.

The recognized gas-forming bacteria are the anaerobic clostridia, of which the three most common are: *Bacillus welchii* (or *perfringens*), *Bacillus oedematiens*, *Bacillus septicus*, and the anaerobic streptococci. The *Bacillus welchii* is said to be a normal inhabitant of the human bowel in 50 percent of individuals. Investigators have found that it can be recovered from many ordinary wounds in the nature of a carrier, without any evidence of gas infection. Recent work in animals by Joseph Aub<sup>1</sup> has demonstrated the presence of this organism in normal uninjured muscle tissue. Taylor<sup>2</sup> injected pure culture of *Bacillus welchii* into the tissues of healthy individuals with nothing more than a localized irritation with a slight systemic reaction for twelve to thirty-six hours resulting therefrom. No formation of gas nor tissue emphysema resulted.

Clinically, gas infections can be classified into five types: diffuse myositis, localized myositis, gas cellulitis, mild systemic, and streptococcic myositis. These are differentiated as follows:

1. *Diffuse gas infection*—onset six to eight hours up to three days, marked systemic symptoms, fever, malaise, anemia, toxemia, and localized as well as progressively spreading edema and gas crepitation of the tissues. There is a lack of odor until late. Characteristic are the thin, serous discharge and the pale, bluish-gray color of the muscles involved, with a loss of contractility on pinching and a failure to bleed on cutting. Vessels incorporated are usually thrombotic. This type is often fulminating and indicates a generalized absorption of *Clostridium* exotoxin. This type is associated with marked muscle destruction and main blood vessel disruption.

Adequate débridement along with liberal incising of the involved adjacent edematous and crepitous tissues or amputation if a gangrenous member is present, in conjunction with penicillin and polyvalent antigas serum, are indicated in these cases.

2. *Localized gas infection*—onset same as in 1 above, but limited to one or more muscle groups. At times only the lower end of muscle is devitalized and infected, and this progresses

1. Aub, Joseph: A Toxic Factor in Experimental Traumatic Shock, N. England J. M., 231:71-75, 20 July 1944.

2. Taylor, K.: Note on a Case of Self-Inoculation with the *Bacillus aerogenes capsulatus*, Lancet, Lond., 2:977-978, 30 Oct. 1915.

upward by virtue of an ascending devitalization secondary to tension and to thrombosis of the main vessels supplying the muscle or group. There is an absence of systemic symptoms for a longer period. This type usually responds to a local removal of involved muscle or muscle group plus penicillin therapy.

3. *Gas cellulitis*—onset usually after third day with slight systemic symptoms, evidenced locally by edema and crepitation, a marked odor, a serous discharge and a positive *Clostridium* culture. It is characterized by slight muscle damage and an absence of blood vessel injury. Treated chiefly by adequate débridement.

4. *Mild systemic*—onset third day or later, very difficult to recognize and associated with localized irritation, slight tissue necrosis, good circulation, and mild rise in temperature for a day or two, culture positive. Self-limited; requires no treatment.

5. *Streptococcic myositis*—characterized by slight gas formation, tense tissues, slight odor, delayed onset for three to four days and in contrast to the foregoing by a thick purulent discharge. Symptomatically the subjective signs in *Clostridium* gas infection are pain and tenderness due to the swelling and tension caused by the formation of gas and edema, provided the infection is limited to a closed space. In open wounds such as soft tissue destruction in battle casualties these may be absent unless the infection spreads to other muscle groups that are still ensheathed. The objective signs are crepitation, change of color of involved tissue, loss of contractility on pinching, lack of bleeding on cutting, sponginess, and excessive serous discharge.

The underlying causative agent in the first four types is identical, and the conjecture is that variation in the clinical course of each is dependent solely on the associated terrain afforded these organisms. Gas infection flourishes in devitalized or gangrenous muscular tissue associated with vascular injury and does not produce further gangrene *per se* but secondarily, through mechanical means, resulting from a choking of adjacent vessels through tension from the edema and gas formation. This results in a progressive thrombosis of vessels and further extension of devitalization of tissue, thus setting up a vicious cycle by continuously creating new suitable terrain for the *Clostridium* to proliferate in. Add to this the knowledge obtained from the studies by Leriche and Kunlin<sup>3</sup> on lumbar sympathetic blocks in which they demonstrated that a venous thrombosis sets up a reflex veno- and arteriospasm, with a further circulatory depletion, and you have an additional potent factor in the exaggeration of said vicious cycle. In the diffuse type, tension due to gas emphysema and edema precedes the infection in its advance and if unreleased by heroic

3. Leriche, R., and Kunlin, J.: Traitement immédiat des phlébites post-opératoires par l'infiltration novocaïnique du sympathique lombaire, *Presse med.*, 42:1481-1482, 22 Sept. 1934.



incising will also create new devitalized terrain. Pain, tenderness, and tension are important early signs in gas-bacillus infection.

Experiences in this hospital in this war confirm these observations and form the basis of prevention and treatment of gas infections in our battle casualties. The prophylactic treatment consists in an early adequate evaluation of a wound through notation of its location, sufficiency of blood supply, ligation of accompanying veins where arteries are destroyed, and the utilization of sympathetic blocks to prevent arteriospasm, thereby improving collateral circulation. When there is an associated fracture, it is important to release all bone pressure impinging on main vessels. In established cases conservatism is practiced by means of adequate excision of the whole involved muscle groups with liberal extension of incisions to release and drain all tissues under tension. Amputations are reserved only for actual gangrenous members and never used for eradication of gas infection alone. Adequate drainage interrupts the vicious circle.

Penicillin is used routinely both as a prophylactic and a therapeutic measure. It is an important adjuvant to good surgical principles. Immobilization in plaster of soft tissue, as well as of fractures, as stressed by J. Trueta, is utilized, as soon as the survival of questionable tissue is conclusive.

#### CONCLUSIONS

1. The medical profession at large should clarify its ideas of the underlying pathology of "gas gangrene" and not merely dismiss this condition as an insurmountable complication represented by crepitation, odor, and toxemia, which spells doom unless prompt amputation ensues, regardless of the presence or absence of gangrene. Pain, tenderness, and tension, developing in any wound, are the important early signs of gas-bacillus infection. Odor is late and is not a definite criterion of gas infection.

2. All types of gas infections etiologically are caused by the same group of gas-forming organisms, but only certain types are associated with gangrene. In this latter group there must be a pre-existing simple gangrene accompanied by arterial trunk occlusion, plus a superimposed gas-bacillus infection. As this infection flourishes, it produces progressive tension through the formation of edema and gas and mechanically chokes vascular nutrition, producing a localized thrombosis in its course, thus setting up a vicious circle.

3. Prophylactically each battle casualty wound must be evaluated as to site of predilection and the arterial status. Vascular interference should be noted and corrected when possible, i.e., release of pressure on vessels by bone when associated with fractures, ligation of the accompanying vein when an artery is severed or occluded, and the use of sympathetic block anesthesia to improve collateral circulation. Each

wound must be adequately débrided early, preferably within eighteen hours, and amputation performed only when a member is totally devitalized.

4. Therapeutically a plea is urged for conservatism in respect to amputations for gas infection *per se*. Early good adequate surgical principles are the prime means of preventing and combating gas-bacillus infections. Penicillin is an important adjuvant in all types and the polyvalent antigas serum seems of definite benefit in the diffuse type to neutralize the clostridia exotoxin. Immobilization in plaster is important.

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## Early Treatment of Combined Bone and Nerve Lesions

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Wounds of the extremity with a combination of long bone fractures and major nerve trunk injuries comprise a sizable proportion of battle casualties reaching the level of general hospitals. In the past, these patients have been rather a sad lot from the standpoint of functional end results. Throughout the North African campaign and the early part of the European campaign they were handled on the orthopedic services. Here the usual treatment for fractures (i.e., skeletal traction or reduction by manipulation, with plaster immobilization) was carried out. The primary objective was to secure correct alignment of bony fragments (i.e., a perfect anatomical reduction of the comminuted fracture).

Immobilization with traction and plaster until the fracture is "frozen" was then a fixed policy in the European Theater of Operations. As a result, most of the combined bone and nerve cases were not sent to a neurosurgical hospital for treatment of the nerve lesion until eight to sixteen weeks after injury. Because of the theater evacuation policy, most of them had to be returned to the States for treatment of the injured nerves. On arrival there, the patients too frequently had stiff or immobile joints and withered, paralyzed muscles. The anatomical reduction of the fracture and the delays occasioned thereby made it impossible to do end-to-end suture of the severed nerves in at least 20 percent of the cases.

All experience, both experimental and clinical, indicates that the best functional results are obtained when divided nerves are sutured early, which means not primary suture but suture after three weeks, when Wallerian degeneration has been completed and the perineurium has become firm enough

to facilitate accurate perineural suture. Results of nerve suture steadily decline after three months, and after six months poor results are the rule.

Early suture eliminates many of the technical difficulties in overcoming gaps. In the late cases in which there is extensive wound fibrosis with corresponding infiltration of fibrous tissue into the nerve trunk and retraction of the nerve ends, large gaps are impossible to overcome without shortening the extremity. Furthermore, experience has proved that most nerve grafts are clinical failures. So far as I am aware, there has never been a successful large nerve graft, either homogenous or autogenous, in the American Army. End-to-end suture is the only solution, and must be accomplished by one means or another if nerve function is to be restored.

Some simple facts about major nerve injuries are still not generally appreciated. An upper extremity with all three major nerves nonfunctioning is useless, and amputation is often the only solution. When the radial and median nerves are severed, the extremity is badly crippled. A combination of median and ulnar nerve palsies leaves the patient with a useless, anesthetic hand. A radial nerve palsy alone is not too serious, for with appropriate tendon transplants the resulting deformity can be successfully overcome. Complete sciatic nerve lesions produce a disability which is often greater than that associated with a properly fitted prosthesis. The trauma of weight bearing on an anesthetic foot leads to serious complications in most cases.

In December 1944, a program to provide early treatment for the nerve injuries associated with long bone fractures was instituted in the E.T.O. Early triage was the first consideration, and an attempt was made to transfer the patient to a neurosurgical hospital in the original plaster. On admission there, through the cooperation of the orthopedist, the plastic surgeon, and the neurosurgeon, every effort was to be made to facilitate early repair of the damaged nerve by (1) early delayed primary wound closure; (2) suture or lysis of the damaged nerve as soon as practicable after the healing of the wound, at which time the orthopedist would do whatever was indicated to the fractured long bone, either by open reduction or internal fixation. It was decided to delay elective operation until three weeks after healing of the soft-tissue wound. In the meanwhile, as soon as the original plaster was removed, the extremity was placed in balanced skeletal traction for immobilization. This not only facilitated management of the fracture, but provided the optimum condition for dealing with the soft-tissue wound, either by simple secondary closure or by one of the various plastic procedures. Penicillin and sulfadiazine were administered one day prior to and three days after the primary delayed wound closure. Physical therapy, including daily electrical stimulation of paralyzed muscles,

was employed from the beginning. This program usually required from five to seven weeks before the elective operation could be undertaken. A booster dose of tetanus toxoid was administered preoperatively. Penicillin was administered forty-eight hours prior to operation and for ten days thereafter. Plaster was used for postoperative immobilization, whether or not internal fixation was employed. Windows were made in the casts over the muscle bellies to allow for postoperative electrical stimulation. During this postoperative period every effort was made to encourage active and passive motion, particularly of the small joints. Incidentally, it has been found that immobilized joints are kept relatively supple by electrical stimulation of the muscles. It is believed that motion of the tendons over the joints reduces the inevitable joint stiffness.

Some three hundred combined long bone and major nerve trunk injuries were treated in this manner within an average period of six weeks after injury. The incidence of complications, particularly wound sepsis, was negligible during the period the patients were observed in this theater. About 10 percent of the patients operated on required shortening or internal fixation of the fractured bones. About 60 percent of the damaged nerves required end-to-end suture; in the remainder, the nerve was found to be intact and simple external and internal neurolysis was done. In one neurosurgical hospital in which a large number of these cases were studied, distribution of the lesions was as follows:

Upper extremity .....	74 %	Lower extremity .....	26 %
Humerus .....	45 %	Femur .....	
Radial .....	70 %	Complete sciatic ...	60 %
Median .....	8 %	Tibial portions	
Ulnar .....	22 %	alone .....	20 %
Radial and/or ulnar		Peroneal portions	
Radial .....	35 %	alone .....	20 %
Median .....	24 %	Tibia and/or fibula	
Ulnar .....	41 %	Tibial nerve .....	7 %
		Peroneal nerve ...	70 %
		Both nerves .....	23 %

In this group, 12 percent of the patients showed spontaneous recovery during the waiting period.

The end results of the early nerve sutures done in this theater are still incomplete; the time interval is too short to make an accurate assessment. Preliminary reports, however, indicate that excellent results may be expected in the radial and sciatic nerve sutures. The brachial plexus median and ulnar sutures give less satisfactory functional results, not because of failure of growth, but because of the inevitable mixing of fibers at the suture line.

## Insulin for Rehabilitation

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An important function of a general hospital overseas is the rehabilitation of psychiatric casualties in order to return as many men as possible to their units. Since many of our patients were 25 or 30 pounds underweight, it was necessary to build up their weight as rapidly as possible. At first, insulin was resorted to in the psychotic reactions only, but the results were so successful that the treatment program was extended to include many patients with anxiety states and other psychoneurotic disturbances.

Our observations closely paralleled those of Debenham et al., who described their treatment of casualties from Dunkirk.<sup>1</sup> They found that a modified form of insulin treatment was useful in some cases for breaking down the vicious cycle of anxiety and weight loss. Increasing doses were given in the morning up to a maximum insufficient to produce coma or hypoglycemic excitement, followed three hours later by 12 ounces of potatoes, or 7 ounces of sugar. The potatoes were used as a source of carbohydrate because of the sugar shortage. The treatment was without any of the risks associated with insulin coma, and it generally produced a rapid gain in weight and improvement in physical condition. They also noticed that insulin had a sedative effect which sometimes lasted for the whole period between administration and interruption. Sargent pointed out that the mere appearance of physical well-being (previous to treatment) was often deceptive. On inquiry, some patients were found to have lost 30 or 40 pounds. He said, "Only when normal physique is restored is the patient fully accessible to psychotherapy and rehabilitation." His best results were obtained in what he described as personalities previously good, who broke down only gradually over a long period of stress. He noticed a peculiar mixture of anxiety, hysterical, and reactive depressive symptoms, and he stressed the importance of good judgment in the selection of cases for insulin treatment, particularly important at that time in view of the shortage of insulin and sugar.

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Because of lack of space, the case reports and charts I and II have been omitted from The Bulletin. They will appear in the author's reprints.

1. Debenham, G., Hill, D., Sargent, W., and Slater, E.: Treatment of War Neuroses, *Lancet*, 1:107-109, 25 Jan. 1941.

2. Sargent, W.: Physical Treatment of Acute War Neuroses, *Brit. M. J.*, 2:574-576, 14 Nov. 1942.

The patients treated at the 118th General Hospital included a number of men with a neurotic or even psychopathic background. The results were surprisingly successful. Many patients were returned to duty in good condition who, at the time of admission, looked as though evacuation to the United States would be necessary. Only one patient failed to gain weight; all the others gained from a few pounds to as much as 30 pounds, and many of them gained almost a pound a day. Although a few patients were unenthusiastic about returning to duty, they seemed to improve almost in spite of themselves and the weight gain was sometimes accompanied by a dramatic subsidence of neurotic symptoms. Neither an apparently unfavorable clinical picture nor serious liabilities in the personal background were necessarily regarded as deterrents, and our indications for insulin therapy depended chiefly on the evidence or history of weight loss, especially when the patient seemed unable to regain his weight under the favorable dietary conditions at the hospital. The patients caught the therapeutic enthusiasm of the staff and some on the medical rehabilitation wards requested transfer to the psychiatric service in order to be given insulin treatment. All of the psychoneurotic patients were returned to duty and a proportion of the patients with acute psychotic reactions made such good recoveries that after a period of observation on open wards it was possible to return them, also, to a full duty status.

#### METHOD

The patients receiving insulin treatment reported to a ward set aside for this purpose, at 7 a.m., without having had breakfast. A large group could be handled at one time. Each man was put to bed and given a hypodermic injection of regular insulin. A special team of nurses and corpsmen observed the patients, learning to detect signs of physiologic response to insulin at the earliest moment. The patient's weight on admission was noted and thereafter was recorded weekly. First Lieut. Cecilia McMahon, A.N.C., chief nurse of the neuropsychiatric section, devised a chart including a short daily description of each patient's physiologic and personal reaction to treatment as well as a note on his behavior during the rest of the day. At the beginning of treatment, a sentence or two describing the patient's condition was recorded at the head of the chart and, at the conclusion, a short summary of the patient's progress was written. The corpsmen were encouraged to report statements of the patients during treatment or at any time during the rest of the day which would give an indication of their personal feelings.

The initial dose, usually 30 to 40 units, was rapidly increased on subsequent days until clinical evidence of physiologic response to insulin had been obtained. Diaphoresis and pallor were usually the earliest recognizable signs. Very few of the patients were

allowed to reach the verge of coma, and it was only on rare occasions that it was necessary to interrupt treatment by the intravenous injection of 50 percent glucose. Almost all patients were able to take sweetened fruit juice by mouth two or three hours after the original injection of insulin. The staff watched carefully for facial twitching, as it was thought best to interrupt the treatment rather than to run any risk of convulsions, especially among the psychoneurotic patients. There were no serious reactions of any sort in our entire series.

The ward officers who were on call throughout the period of treatment were prepared to administer intravenous glucose or even intravenous plasma in case irreversible coma should develop, but the latter measure was never necessary.

During treatment, most of the patients dozed or slept and following termination with fruit juice each man took a shower, dressed, and went to lunch, which was served on the ward in order to see that they received enough food to satisfy their increased appetites. During the afternoon they joined other patients in athletics, at work details, or reported to the craft shop; some of them even went out on pass during the afternoon, carrying candy with them in case of a delayed hypoglycemic reaction. That they slept most of the morning did not seem to affect their ability to sleep at night; in fact, the relaxation resulting from the treatment helped most of them to sleep better.

Treatment was given every day except Sunday and was continued, on an average, two to four weeks, depending on the rapidity with which the patient gained weight and on his general clinical improvement.

#### REACTION TO TREATMENT

A wide individual difference in response to insulin was observed. This was manifest in the variation of insulin dosage necessary to produce a minimal physiologic response (this varied from 20 to 120 units) and also in various patterns of neurologic and personal reactions more or less characteristic of each patient. As treatment progressed, it was often necessary to reduce the dosage; the ward officer determined the next day's dose after reviewing the nurse's notes made at the conclusion of each day.

It became increasingly evident that the personal response of each patient to the insulin treatment was often clearly expressive of his dominant general trends and attitudes. The treatment situation had a somewhat different significance for each man, and careful observation of the response provided an opportunity to learn something in this regard. The way the procedure was carried out provided an atmosphere of protection and solicitude which was evidently felt as such by many of the patients who



made statements indicating an almost childlike attitude of dependence during the course of the treatment. Patients with strong feelings of resentment often responded favorably to what they regarded as tangible assistance for complaints which might expose them to the implication of gold-bricking or insanity.

Regaining weight seemed synonymous in the minds of some patients with a repossession of what they regarded as their personality previous to exposure to the strains of warfare. At the conclusion of treatment, some patients exhibited photographs of themselves as they had looked before coming overseas and were delighted to realize that they again looked the same. One patient was discovered on several occasions smiling at himself in the mirror. Almost all of them developed an aggressive appetite, and this seemed to help those suffering from panic and confusion to reorient themselves. Perhaps the strong inner hunger helped to separate delusional projections from the more inward self.

Some patients were a bit apprehensive during the first few days of treatment. Although the nurses and ward officers were able to reassure them to some extent, it may be that the anticipation that something was about to happen helped to dramatize the possibility of recovery and tended to reinforce the therapeutic relation between the patients and those who were taking care of them. Quite a number of patients with acute psychotic episodes manifested passive trends of a pathologic type, often expressed as a fear of imminent electrocution or of being machine-gunned. For them, the insulin treatment often seemed to represent an experience akin to death and resurrection, from which they emerged with a sense of guilt expiated.<sup>3</sup>

Almost any psychotherapy in the army setting must be considered in terms of group therapy, because soldiers are acutely aware of the attitudes of their fellows. The results of a form of treatment participated in by a group of patients are therefore influenced by the general attitude toward what is being done. The fact that new patients can observe the weight gain and other beneficial effects on those completing the treatment helps to create a favorable atmosphere.

#### DISCUSSION

Treatment was almost always terminated by the oral administration of sweetened fruit juice; intravenous glucose was rarely necessary. This is indicative of the depth of the physiologic response, which rarely went much beyond the so-called cortical phase, and would correspond to the first of the five stages of hypoglycemia described by Himwich (as quoted by Alexander and Portis)<sup>4</sup> and ascribed by him to the different metabolic rates in the various regions of the brain, the highest being in the newest portions and each succeeding part possessing a lower

3. Fox, Henry M.: A Variety of Furlough Psychosis, *Psychiatry*, 7:207-213, Aug. 1944.

4. Alexander, Franz, and Portis, Sidney A.: A Psychosomatic Study of Hypoglycaemic Fatigue, *Psychosom. Med.*, 6:191-206, July 1944.

rate. The cortical phase is characterized by sweating, salivation, muscular relaxation, and tremors accompanied by gradual clouding of consciousness. A few of our psychotic patients were allowed to go into the second, the subcortico-diencephalic phase, with motor restlessness manifested by primitive movements, such as snarling, grimacing, and grasping. An occasional psychotic patient was allowed to reach the mesencephalic phase of tonic spasm with the appearance of a positive Babinski reflex, but only one or two reached the phase of extensor spasm.

The patients were more or less conscious throughout the treatment and this was apparently advantageous in helping to bring about active rehabilitation. In the slightly altered state of consciousness, patients were often able to speak freely of experiences which they had not previously described and a helpful unburdening was thus brought about. One patient during his thirteenth treatment began talking about his combat experiences. "When we came back, my buddy blew his brains out; so they gave me a fifteen-day furlough. Sometimes I think I'd be better off if I did what he did. I'll just tell my sister I am bomb-happy—guess I won't need to blow my brains out—she won't know." Speaking of these things seemed to help him and at the conclusion of his treatment he had gained 15 pounds, felt much improved, and returned to duty.

The spontaneous verbalization under insulin was likely to be less disturbing than that obtained during a sodium amytal or sodium pentothal interview, which was apt to be regarded by the patient as an aggressive attempt to elicit painful memories which he would rather conceal.

A further advantage of the insulin method is that at the termination of treatment the patient is fully alert and able to participate in activities instead of remaining in a toxic, beclouded state as is the case following the administration of barbiturates. Hypnosis, which, like sodium amytal, is of great value in certain situations and also produces an altered state of consciousness, has the disadvantage of giving the patient an unpleasant sense of increased passivity which is often resented and is apt to place excessive stress on the dependent relationship of the patient to the physician. Following hypnosis, the patient returns to normal consciousness at the command of the hypnotist; whereas during insulin treatment following the administration of fruit juice, the patient returns to full alertness in response to an inner readjustment of the biochemical balance. Franz Alexander speaks of a "vegetative retreat," during which internal processes become attuned to a state characteristic for relaxation in which the vago-insular tonus is preponderant over the sympathetic adrenal tonus. In a sense, the insulin treatment as carried out on our soldier patients provides several hours of "vegetative retreat" each morning, during which they perspire and doze, a state particularly helpful to men whose states of panic and anxiety have

probably stirred up the adrenal sympathetic system to an excessive degree.

#### CONCLUSION

A modified form of insulin treatment has been found to be of great value in promoting the rapid rehabilitation of soldiers who have been unable to regain lost weight and who have developed reactions of acute panic or more protracted states of anxiety.

The treatment has been helpful to a wide variety of patients. It has been used to reinforce the personal psychotherapeutic relationship and to give the soldier enough of a lift so that he can handle his own problems sufficiently well to return to duty. A goal of amelioration can easily be achieved with most of the patients, nearly all of whom at least gain weight.

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## Second-Year End Result of Arthrotomies of Knee

LIEUT. COLONEL LEON J. WILLIEN

Medical Corps, Army of the United States

A review of the literature fails to show an adequate follow-up study on knee-joint surgery done on soldiers. The rapid shifting of Army personnel makes an adequate follow-up difficult. In 1943, the orthopedic section of the hospital at Fort Jackson, South Carolina, planned to find out what happens to these soldiers and was able to follow up<sup>1</sup> 80 percent of the soldiers who had a knee-joint operation during 1942. The following conclusions were made: (1) The average preoperative length of military service of the 75 soldiers operated on was eleven and one-half months. (2) Internal derangements occurred with less frequency among Negro troops. (3) Officers or noncommissioned officers were twice as likely to return to, and remain on, full duty as were privates and privates first class. (4) Tears of the medial meniscus accounted for almost half of the pathologic conditions found at operation. (5) Our accuracy of diagnosis was 89.5 percent in that eight knees presented no pathology at operation. (6) The average length of stay in the hospital following operation was fifty-eight days, which is not long enough for complete rehabilitation. (7) We were wrong on the estimate of the duty capabilities of 70 percent of the soldiers who were eventually reclassified. (8) Tears of the medial meniscus and cysts of the medial and lateral menisci and, strangely enough, osteochondritis cases

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1. Cleveland, M., Willien, L. J., and Doran, P. C.: Surgical Treatment of Internal Derangement of the Knee Joint Among Troops in Training at Fort Jackson, South Carolina; End-Result Study, *J. Bone Surg.*, 26:329-336, Apr. 1944.

were highest in the percentage of surgical rehabilitation. Tears of the lateral meniscus, or of both menisci, and those derangements associated with fractures into the joint required the highest rate of reclassification or discharge. (9) The line of duty of the injury had no bearing on the patient's rehabilitation. (10) Those who were in the Army longest were able to remain on full duty, probably because their commanding officers made allowances for a trained man, while the same allowance was not made for an untrained man. (11) Infantrymen required reclassification more frequently than soldiers in other branches of the service. (12) Our diagnostic accuracy was dependent on physical signs in spite of an accurate history. (13) At the end of the first year, 46 percent were on full duty, 42.9 percent had been reclassified, and only 6.3 percent had been discharged for disability. (14) The emotional stability and personality of the patient is as important as the knee pathology in considering the treatment or disposition.

We then endeavored to obtain a two-year follow-up study on the 75 soldiers who had a knee-joint operation at Fort Jackson during 1942. Every case has had a minimum follow-up period of twenty-four months, and reports have been received on 100 percent of our cases. This second-year end-result study should be of value for Army surgeons, since it indicates what final end results may be expected and may stimulate similar studies.

We have had reports from all theaters of operations, as 19 of these soldiers are now or have been overseas. One man has been wounded in action, and another has received the Bronze Star for gallantry in action. Four of the soldiers have reached officer status and one more is at officers' candidate school. We have not classified any man without an official letter from his organization or from The Adjutant General's Office. We have received many letters from the patients themselves. Those who were doing full duty, almost without exception, complained of some stiffness in damp weather; otherwise, they had no complaints.

Again, we have depended on the duty status of the individual to determine the success or failure of the surgical treatment of the knee. Such an end-result study puts the opinion of the success of the surgery on the soldier, his medical officer, his commanding officer, and other medical officers on discharge boards in other hospitals. This does not reflect a scientific evaluation of each knee by a competent orthopedic surgeon, since it is a well-known fact among military surgeons that soldiers may use a surgically treated knee, or any other postoperative condition, as a means of avoiding military service when objectively the part is perfectly normal. This is

shown by the fact that our study has revealed several medically discharged soldiers to be steadily engaged in civil occupations with never a lost day because of knee disability. We have had the opportunity to examine two soldiers at the end of their second postoperative year with no objective signs or x-ray evidence of further trouble within the joint; yet both men were on a limited service status. We believe that careful selection of patients from the standpoint of emotional stability and personality is indicated by the fact that only one patient, an officer, has been discharged from the Army because of psychoneurosis.

Table I shows the status of those soldiers whose end results are known, at the end of the first postoperative year (1943) and at the end of the second postoperative year (1944).

TABLE I

<i>1943</i>	
Full duty	29 or 46.0 %
Limited service after operation	27 or 42.8 %
Limited service prior to operation	3 or 4.8 %
Certificate of Disability for Discharge	4 or 6.3 %
	63 or 100 %
<i>1944</i>	
Full duty	29 or 38.6 %
Limited service	18 or 24.0 %
C.D.D. on account of knee	14 or 18.6 %
C.D.D. for other reasons	7 or 9.3 %
Discharged under other regulations	7 or 9.3 %
	75 or 100.0 %

A careful selection of cases is necessary to assure a high rate of return to full duty. It is to be emphasized that less than 15 percent of the total knee injuries were operated on, an incidence of 1 in each 295 admissions for all causes. The cases were carefully selected from the standpoint of joint

pathology as well as that of emotional stability and desire to get well and to do a job again in the Army. Of the 75 soldiers, 62 percent are still in the Army—38.6 percent on full duty and 24.0 percent on limited service.

Among the soldiers in the infantry, 44 percent of the total group, the breakdown was as follows: full duty, 26.4 percent; limited service, 32.3 percent; C.D.D. on account of knee, 14.7 percent; C.D.D. for other reasons, 8.8 percent; and discharged under other regulations, 17.6 percent.

These figures show a higher percentage of reclassification to limited service, a lower C.D.D. rate, and a higher discharge under other regulations than for the group as a whole. These figures are hard to interpret but are believed to represent in large part two factors: (1) the desire of all infantry commanders to have absolutely perfect soldiers in their organization; and (2) the desire of soldiers to get out of the difficult and hazardous duties of the infantry. This study permits us to conclude that only 26 out of every 100 men in the infantry will last in this type of duty two years after operation. However, it should be kept in mind that all were unfit for this type

of duty preoperatively; that many were improved for limited duty in the Army; and that less than 19 percent were discharged on C.D.D. after varying periods of duty.

*Analysis of discharges.* The most striking fact is that of the total of 28 discharges, 16, or 55 percent, were discharged during the period August to October 1943, which was the period during which W.D. Circular No. 161 was operative. This directive eliminated the classification "limited duty" and led to the discharge of many men fit for some type of duty but not qualified for full duty.

This table further shows a considerable increase (two and one-half times) of those discharged on a Certificate of Disability for Discharge in 1944 over those so discharged in 1943. At the same time, there is a comparable drop of those on a limited service status. This indicates that those previously on limited service have now been separated from the service. The reassignment or discharge of a soldier with a postoperative knee is variable, depending on the judgment of individual medical officers and on interpretation of existing regulations regarding physical standards for retention in the Army. It is noteworthy that War Department Circular No. 161, 1943, directing the discharge of all men with some disability whose commanding officer did not desire to keep them, resulted in the discharge from the Army of 50 percent of the total cases so disposed of in a three-month period, August to October 1943. This compares exactly with a study of the disability discharges from the entire Army as reported in the *Bulletin of the U. S. Army Medical Department* in December 1944, which states in part:

"While the essential decision to discharge enlisted men for physical reasons rests on the findings of a board of medical officers, the number of enlisted men coming up for discharge and the number of C.D.D.'s granted reflect preponderantly the Army's personnel policies rather than the occurrence of physical defects as modified by changes in physical standards or other medical considerations. A review of the trend of the discharge rate for physical reasons from June 1943 through September 1944, in the light of various directives pertaining to discharges, brings out clearly that the discharge rate has been markedly influenced by administrative policies. \* \* \* The sharp rise in discharges during August and September of 1943 is traceable to the directive (W.D. Circular No. 161, dated 14 July 1943) requiring re-examination and discharge of limited service men who did not meet current physical or mental standards." A comparison of the follow-up for 1943 and for 1944 has revealed no essential change in the conclusions reached in the first study.

The institution of reconditioning facilities in military hospitals has proved a real asset in providing a means for gradual resumption of full duty while still under hospital control. This

is extremely important following an arthrotomy of the knee, since muscle atrophy of the thigh is always present and strength returns slowly. If the patient is pushed too vigorously in his convalescence, there may result an unstable knee by throwing too much strain on the ligaments of the joint before muscular development has progressed sufficiently. A gradual resumption of activity as provided in the Army's reconditioning program will result in a lower rate of reclassification or discharge by providing a gradual return of activity correlated to the increase of muscle power and of joint motion. However, not infrequently, cases are placed in advanced reconditioning programs before quadriceps strength has developed. It is, therefore, important that careful attention be paid preoperatively and immediately postoperatively to therapeutic muscle exercise and that activity be limited in accordance with the state of recovery of muscle power.

#### CONCLUSIONS

Among 75 soldiers who underwent knee surgery at Fort Jackson during 1942, more than 6 out of 10 men, in spite of variable policies regarding retention in the Army, were saved for further Army service, 38.6 percent in full duty and 24 percent in a limited service assignment.

The complete rehabilitation of 38.6 percent of surgically treated knees is insufficient to warrant this type of surgery as a routine procedure. Those with a definite history of derangement antedating military service should be reclassified or discharged without surgery, depending on the severity of the damage present in the knee. If the injury has been incurred in line of duty, surgery should be undertaken, if indicated, after a careful evaluation of the emotional stability of the soldier. In the latter group, soldiers to be discharged should be given the benefit of surgery if they desire, but the rate of discharge for disability in this group should not reflect unfavorably on the value of knee surgery in general. If surgery is done, the resumption of activity should be carefully graded by taking full advantage of physical therapy and the reconditioning program.

This report shows that a follow-up study is possible and feasible in the Army. While such a study does not represent a scientific evaluation of each soldier by a surgeon, it does reflect the soldier's, his commanding officer's, and his medical officer's opinion of the surgery as well as War Department personnel policies.

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**Meritorious Service Unit Plaque.**—The 300th General Hospital has been awarded the Meritorious Service Unit Plaque by Major General Morrison C. Stayer, surgeon of the Mediterranean Theater of Operations, for superior performance of exceptionally difficult tasks in the Peninsular Base Section from 1 April to 1 July 1944, the time of the break out from Anzio and the Rome-Arno drive. In July 1944, the hospital was made a 2,000-bed hospital with facilities to expand to 3,000.



## Persistent Hepatitis in Patients Returning from Overseas

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Hepatitis has been a major cause of disability in military personnel in this war; heretofore, it was regarded largely as a benign, self-limited disease, which lasted several weeks, then resolved, leaving no residual effects. Occasionally, the process would progress rapidly to the acute dramatic terminus of an "acute red or yellow atrophy." It is now recognized that prolonged or permanent hepatic dysfunction may occur. The acute stages of the disease, as seen in soldiers, have been repeatedly described. The clinical picture and significance of the prolonged disability merit further elaboration.

After convalescence overseas is prolonged beyond several months, the patients are evacuated to the zone of the interior, where they are concentrated for a short while at a debarkation hospital before dispersion among various general hospitals. Observations in a debarkation hospital permit evaluation of the over-all picture and incidence of unresolved, lingering hepatitis.

The overseas record of each patient admitted to this hospital was reviewed. Any case which varied clinically or etiologically from the anticipated course (more than 100 of these patients were encountered) was clinically investigated in greater detail and the available laboratory studies supplemented. Thirty patients who had been evacuated because of lingering hepatitis were subjected to sensitive liver function tests.

*Incidence.* From June 1944 to May 1945, 568 patients with the diagnosis of hepatitis as sole or contributory disease were returned from overseas to this hospital. Thirty-four additional patients were seen who developed acute hepatitis while en route to the zone of the interior. They were detained at this hospital until convalescence was well established.

*Clinical picture.* In most instances, in soldiers returned from overseas with the diagnosis of hepatitis the clinical picture was predominantly characterized by subjective symptoms, which constituted the primary reason for their evacuation. Their complaints included weakness, lassitude, easy fatigability, and insomnia. Anorexia, constipation, epigastric distress, pains in the right upper quadrant after exertion or over-

eating, and an intolerance to fatty foods were noted. Review of the records revealed that most of these complaints were similar to those present during the prodromal period of the disease. Many soldiers were able to ingest fatty foods, despite the fear of intolerance. With others, nausea and vomiting developed if fried foods were ingested.

Physical examination revealed that very few of the patients had visible jaundice of the skin; some showed a barely perceptible sclera icterus. According to their records, some of the patients had had no jaundice during the course of the disease; however, the simultaneous presence of other cases of hepatitis, the subjective complaints of the patient, and impaired liver function as established by various tests had caused the attending medical officers overseas to diagnose hepatitis. In the debarkation hospital, about 10 percent of all observed cases revealed a palpable, tender liver. In no instance was a palpable spleen found, although a review of the clinical records showed that about 25 percent had had a palpable spleen during the acute stage of the illness.

*Laboratory findings.* In thirty patients with marked subjective complaints but no clinical findings ascribable to active hepatitis, normal BSP (bromsulfalein) tests, absence of urinary bilirubin, and normal urinary urobilinogen concentrations were found. No anemia was observed which could be ascribed to the hepatitis process. The white count was normal; occasionally slight leukopenia was noted. In the differential count, recorded during the convalescent stage, the percentage of lymphocytes was slightly higher than normal, in contrast to the polymorphonuclear leukocytosis recorded during the earlier stage of the disease. The sedimentation rate revealed great variation, and no fixed pattern could be elicited.

*Course.* Several patients had a marked exacerbation of pain in the right upper quadrant, nausea and vomiting, associated with epigastric distress after alcoholic ingestion during a visit to the neighboring town. Sensitive liver function tests performed in these cases the next morning were normal. Two patients, admitted with the diagnosis of chronic hepatitis without jaundice, developed clinical icterus after physical activity. Otherwise, no significant change in the clinical picture was observed during the return voyage or short stay at this hospital. The following two exceptions are recorded in greater detail because of their marked significance.

1. A 32-year-old soldier became ill, on 10 February 1945, with malaise, nausea, anorexia, and abdominal pains, followed by jaundice and itching. The liver was tender and palpable, the urine dark, and the feces clay-colored. These symptoms, including jaundice, increased after admission to hospital. Laboratory findings of severe liver function impairment with intra-hepatic biliary obstruction prevailed until the beginning of April, when the icterus decreased from over 200 to 82, with marked improvement of the symptoms. In view of the duration of the disease, he was evacuated

to the zone of the interior. On board the hospital ship, he improved further and was permitted to become ambulatory. No restrictions on diet or activity were imposed. Suddenly, on 27 April, abdominal pains, nausea, vomiting, and marked jaundice recurred. On 1 May, he was admitted to this hospital in a semicomatose state. The icterus index was 240. Petechial spots were noted on the abdomen; the liver edge was not palpable. He died after admission, and necropsy revealed a subacute diffuse necrosis of the liver (red atrophy).

2. A 30-year-old soldier from overseas was admitted to this hospital on 30 May 1945, with minimal gastrointestinal complaints, convalescing from an acute hepatitis with jaundice, which had been contracted two months ago. He had been allowed to become ambulatory while on board the hospital ship, with no limitations of activity. On admission, there was an icteric tinge to his sclerae, mucous membranes of the mouth, and skin. The liver and spleen were not palpable. On 2 June 1945, while awaiting evacuation as an ambulatory patient, he suddenly complained of abdominal pains, became nauseated, and began to vomit. He then revealed that persisting anorexia had started the day before. Icterus increased and despite active supportive therapy his condition became progressively worse. Total blood bilirubin rose to 30 mg. percent, and he died in coma on 6 June 1945. The necropsy revealed subacute diffuse necrosis of the liver (both red and yellow atrophy).

Additional necropsy material was also available on four of the thirty-four patients who developed initial clinical manifestations of hepatitis while en route to the zone of the interior. The four patients had suffered antecedent gunshot injuries 72, 64, 60, and 61 days, respectively, before the onset of the hepatitis. Record of transfusion was available only in the second case. Death occurred 1, 17, 5, and 7 days after the onset of symptoms attributable to liver dysfunction. Diffuse hepatic necrosis was found at the autopsy. The other patients convalesced uneventfully.

It is noteworthy that of the thirty necropsy studies (fifteen died on hospital ships and fifteen in this hospital) performed on patients who were being evacuated to the zone of the interior five showed fatal hepatitis, including two with acute exacerbation of hepatic disease.

*Combination with other diseases.* Among the observed cases of hepatitis in soldiers returning from overseas, 352 had hepatitis alone. Hepatitis associated with an antecedent or concomitant medical disability was found in 103. Thirteen had

TABLE I  
*Major disabilities associated with  
lingering hepatitis in 568 cases*

ADDITIONAL SURGICAL DIAGNOSES	
Penetrating wounds .....	62
Thorax .....	37
Abdomen .....	25
Nonpenetrating wounds .....	38
ADDITIONAL MEDICAL DIAGNOSES	
Gastrointestinal disturbances .....	35
Gastroenteritis, nonspecific .....	19
Amebic dysentery .....	7
Duodenal ulcer .....	4
Cholecystitis .....	3
Colostomies .....	2
Infectious disease .....	14
Malaria .....	8
Syphilis .....	2
Atypical pneumonia .....	4
Miscellaneous .....	7
Anemia, hypochromic .....	5
Malnutrition .....	2

hepatitis preceded by both trauma and disease. Table I reveals the traumatic and medical diseases involved. Patients with amebic dysentery had been adequately treated with emetine. Their clinical course differed in no respect from the other cases. The malarial patients (*vivax* type) were clinically under control at the time of the outbreak of the disease.

*Etiological factors.* Because of the opportunity to interview and examine a large number of patients who had hepatitis, information was collected as to possible etiological factors. Rarely was a specific history of hepatitis in other members of the patient's organization elicited. On several occasions, hepatitis developed in orderlies or nurses who were on duty in a hepatitis ward. No incidence of postvaccinal hepatitis or leptospirosis was encountered in this series. Protracted periods of dietary insufficiency or starvation before the development of jaundice were not recorded. In about one-sixth of the cases, trauma had preceded the hepatitis. No reliable records are available, but it may be assumed, based on histories from patients after arrival here, that at least 80 percent of soldiers with antecedent trauma had received transfusion of whole blood or one of its derivatives. In the great majority of cases, symptoms of hepatitis appeared from two to four months after the injury. No specific example of acute food intoxication was noted which could be causally related to the onset of symptoms, but 19 cases had gastroenteritis as additional diagnosis. Ten soldiers had had jaundice before entering the military service, which could not be chronologically related to the present attack.

#### COMMENT

The number of soldiers evacuated to the zone of the interior because of persistent clinical symptoms during their convalescence from acute hepatitis contracted overseas is surprisingly high. The incidence of this lingering type of hepatitis in relation to the total number of cases of hepatitis is not known. The manifestations are subjective, and a recent study<sup>1</sup> has indicated that some of these are probably functional. However, several authors<sup>2 3 4</sup> have stressed the relation of persistent subjective complaints to chronic hepatic dysfunction. As a rule, these patients were not jaundiced, and the limited liver function tests performed on this group did not establish functional impairment. It has been shown elsewhere, however, that patients who have had hepatitis may reveal impaired liver function for many months.<sup>2 4 5</sup> According to Eppinger<sup>6</sup> and

1. Benjamin, J. E., and Hoyt, R. C.: J.A.M.A., 128:319, 2 June 1945.

2. Soffer, L. J., and Paulson, M.: Arch. Int. M., 53:809, June 1934.

3. Polack, E.: Acta med. scand., 93:613, fasc. 6, 1937.

4. Kornberg, A.: J. Clin. Invest., 21:299, May 1942.

5. Altschule, M. D., and Gilligan, D. R.: N. England J. M., 231:315, 31 Aug. 1944.

6. Eppinger, H.: Die Leberkrankheiten, Vienna, Julius Springer, 1937.

others,<sup>7 8 9</sup> apparent recovery from catarrhal jaundice may be followed by progressive changes which terminate in cirrhosis. The possibility that these patients with persistent clinical symptoms (which are similar to those seen in the early stages of the disease) may gradually develop chronic liver disease should be more thoroughly investigated.<sup>10</sup> The incipient stages in the development of liver cirrhosis are not known. Possibly these clinical symptoms herald the onset of chronic liver function impairment. The optimistic reports as to the beneficial results of dietary management in human cirrhosis<sup>11 12 13</sup> make it highly desirable to detect and treat these cases early.

A more immediate problem than the development of chronic hepatic disease is the sudden exacerbation of a latent process with a fatal termination in convalescent patients. This may occur even though convalescence appears to be established by clinical and laboratory data. Mobilization of patients with jaundice should therefore be delayed until the jaundice has completely subsided. During the convalescent jaundice-free period, physical excesses and alcoholic ingestion are to be avoided. Education and restriction of the activities of these patients may prevent loss of life due to diffuse hepatic necrosis.

Patients with lingering hepatitis represent a medical and administrative problem. They merit dietary supervision, rest, medical control, and gradual return to duty. A standardized laboratory examination, using sensitive liver function tests, should precede final disposition and serve as base for future observation.

This study contributes little to the problem of the etiology of hepatitis. "Catarrhal jaundice," hepatitis following gastrointestinal disturbances and intoxications, hepatitis following the administration of homologous serum, postvaccinal hepatitis, and epidemic human hepatitis, are now considered identical diseases. The virus agent, presumably responsible,<sup>14 15</sup> has as yet not been isolated. In this series, neither vaccination nor gastrointestinal intoxication was related to the hepatitis. The only etiological factor found in a number of our cases was trauma; however, two possibilities must be taken into consideration: (1) soldiers with traumatic injury usually receive blood and plasma transfusion; and (2) the protein metabolism may be adversely altered by the injury and the reduced food intake of a severely sick patient. Jaundice occurring two to four

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months after an injury supports the first rather than the second possibility.

#### SUMMARY

Lingering hepatitis is a frequently encountered cause for disability of patients seen in a debarkation hospital. They are convalescents from attacks of acute hepatitis suffered overseas and, as a rule, no longer reveal jaundice, but show subjective clinical symptoms similar to those noted in the prodromal state, without objective or laboratory manifestations of hepatic disease. They appear susceptible to exacerbation following dietary, exertional, or alcoholic excess. Because of the possibilities of acute, possibly fatal, exacerbations and chronic liver damage, it is recommended that a complete evaluation of these patients be undertaken before a return to unrestricted activity is permitted. The active mobilization of these patients should be deferred until convalescence is well established, and then undertaken under proper precautions. The only etiological factor elicited (and that only in about one-sixth of the cases) was an antecedent trauma with associated administration of blood products.

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## Myocardial Complications of Cutaneous Diphtheria

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and

MAJOR CLARENCE S. LIVINGOOD

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A diagnosis of cutaneous diphtheria was made in 141 American soldiers admitted to a general hospital in the India-Burma Theater from July through December 1944. Severe myocarditis, with rapidly fatal outcome, occurred as a complication in one of the first of these patients to be admitted. Subsequently, patients in whom the diagnosis of cutaneous diphtheria was suspected were isolated at complete bed rest, given antitoxin and local therapy, and repeatedly examined for clinical evidence of cardiac disease; electrocardiograms were made at 15- to 30-day intervals. Any patient with symptoms, signs, or electrocardiographic changes suggestive of cardiac involvement was especially closely observed. This regimen was continued until it was considered that all danger of a cardiac complication had passed.

In the 141 patients, myocarditis was diagnosed as a certainty in four, one of whom died, and it was considered very probable in three others, a total incidence of 5 percent. In an additional seven patients (5 percent) it was considered pos-

sible that a minimal myocarditis had occurred, but the diagnosis could not be more definitely established.

The electrocardiograph was more reliable than the clinical examination in detecting the presence of myocarditis. From an analysis of the tracings, several conclusions could be drawn: (1) tachycardia was not an important feature; (2) extrasystoles were no more frequent than one would expect in normal individuals; (3) PR interval prolongations of over 0.20 seconds were not observed in any patient in whom the diagnosis of myocarditis was made, although, in the patient who died, P waves could not be definitely identified; (4) except in the patient who died, QRS complex changes were not striking; (5) the most striking abnormalities were in the T waves, especially in CR<sub>3</sub>. Depression or frank inversion of the T waves was observed in all of the patients in whom the diagnosis was made.

With few exceptions, symptoms were far more striking in patients who did not have any evidence of organic cardiac disease than in those who had a real cardiac complication. Typical cardiac neurosis phenomena occurred with great frequency on the cutaneous diphtheria wards. It is interesting, and probably significant, that palpitation was never a symptom in patients with myocarditis. In the patient who died, abdominal pain, nausea, and breathlessness were the principal symptoms. In the other six patients with myocarditis, two complained of dyspnea and dizziness when erect; the remainder had no cardiac symptoms, although, if activity had been permitted, symptoms might have been present. The patient who died showed extreme pallor, a very feeble and rapid pulse, engorgement of veins of the neck and the liver, hypotension, and feeble heart sounds with distant gallop rhythm. Physical signs in the other patients were not impressive. In two the systolic blood pressure was below 100 mg. Hg., and the heart sounds were feeble. The hearts were not clinically enlarged, the veins were not engorged, and murmurs were not heard. Laboratory findings were generally normal. A leukocytosis of 22,000, predominantly polymorphonuclear, was present in the fatal case. Sedimentation rates were normal in five of the seven patients.

A clear-cut relationship existed between the severity of the cutaneous disease and the development of the cardiac complications. The period between the third and seventh weeks of the cutaneous diphtheria was that in which myocarditis developed if at all. Evidence of the myocarditis lasted from twenty-eight to ninety days, except in the patient who died four days after the onset of symptoms. The onset of neurological complications, which developed in 45 percent of the 141 patients, accompanied, preceded, or followed the onset of the myocardial complication in four instances. Three patients, including the one who died, developed myocarditis but did not develop neuritis. Of the seven patients in whom the



diagnosis of diphtheritic myocarditis was made, one died, two were reassigned to noncombat duty, and three were returned to the United States. The changes in duty status in the patients who survived were on the basis of neuritis or indolence of the skin lesions, for by the time of discharge all evidence of myocarditis had disappeared.

The following impressions were formed regarding the cardiovascular management of patients with cutaneous diphtheria: (1) Patients in whom this diagnosis is suspected should be immediately evacuated to a general or station hospital where adequate facilities for isolation, study (including electrocardiography), and treatment are available. (2) All patients in whom the cutaneous disease is active and spreading should be confined strictly to bed. Thereafter, the degree of activity allowed and the intensity of clinical and electrocardiographic study should depend on the severity of the lesions. In mild cases ordinary ward activities should be permitted, with tracings taken about every two weeks until three weeks after the lesions have begun to heal. In severe cases, strict bed rest should be enforced for about six weeks after the lesions have begun to heal, with tracings every week until about eight weeks after healing has commenced. (3) Our information concerning the efficacy of antitoxin in preventing myocardial complications is inadequate. We used 20,000 to 40,000 units; perhaps larger doses would have had more evident beneficial effects.

#### SUMMARY

Myocarditis developed in 5 percent of a group of 141 patients with cutaneous diphtheria. In an additional 5 percent a myocardial complication could not be entirely excluded.

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## Caterpillar Dermatitis

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A skin ailment observed in New Guinea, at times in epidemic proportions, was an eruption that greatly resembled the ordinary variety of urticaria. The lesions consisted of typical wheals with an erythematous areola and many pseudopodia, but with no central hemorrhagic punctum or vesicle formation. The lesions usually were discrete, but by contiguity could affect large areas, resembling giant urticaria. They were mainly on exposed portions of the skin, particularly the neck, upper extremities, and upper part of the trunk, if the soldier was not wearing a shirt. The face was rarely affected. The eruption came on immediately after putting on some article of clothing that had been lying in the tent or following the use of a towel after a shower. As the wheals disappeared in three to six hours, many officers regarded the eruption as typical

urticaria due to allergy. For this reason, adrenalin, 1:1,000 subcutaneously, and ephedrine sulfate capsules by mouth were prescribed, but without any demonstrable benefit. In the wake of many of the wheals, appeared discrete and conglomerate, red, firm, split-pea-sized, intensely pruritic papules with a halo of diffuse erythema that could be expressed by diascopic pressure. This eruption gradually disappeared by the end of ten to fourteen days. Where large areas of the skin were affected, the draining lymph glands might be enlarged and tender. The pruritus caused scratching that left hemorrhagic crusts marked by a residual brownish pigmentation that gradually faded. During the retrogression of the eruption any friction against the affected skin, as in washing the part, caused reappearance of the urticarial efflorescence with its attendant pruritus.

The first clue was given by a soldier who stated that the eruption appeared after he used a towel from which he had brushed a caterpillar. That the caterpillar was the causative factor was further indicated by the appearance of an urticarial eruption after the author had allowed the insect to crawl on his arm for several days. This was duplicated on other subjects.

White<sup>1</sup> described a similar eruption caused by the caterpillar of the brown-tail moth. Tyzzer,<sup>2</sup> who reported an urticarial eruption caused by the same insect, postulated that the rash was produced by mechanical penetration of the hairs of the caterpillar into the skin. He claimed that the hairs act as irritants by virtue of poisons in them and, by histologic examination of the skin of the caterpillar, showed that the hairs are connected with unicellular glands. In 1923 Bishopp reported an epidemic of "urticaria" in many thousands of the population of Texas caused by the "puss caterpillar."<sup>3</sup>

When the condition was again encountered in northern Australia, experiments were made to attempt to formulate the *modus operandi* of the eruption. In this region, the common offender is a caterpillar that at full development measures 1 to 1½ inches in length and ¼ inch in width. The abdominal segments are black with a triangular white or red area on the dorsal surface of each segment. This array of color explains the entomologic nomenclature—*Ochrogaster* (black stomach) *contraria*. The entire body is covered with fine hairs.

#### EXPERIMENTAL DATA

Several specimens of this species were allowed to crawl on the arms of fifteen volunteers for ten minutes. All of them reacted positively; some in a minute or two developed typical wheals which disappeared in three to four hours to be followed by a localized, pruritic papular eruption for several days. Others presented, within six hours, a discrete papular eruption

1. White, J. C.: *Dermatitis Produced by a Caterpillar*, Boston M. and S. J., 144:599, June 1901.

2. Tyzzer, E. E.: *Pathology of Brown-tail Moth Dermatitis*. J. Med. Res., 16 (new series 11): 43-64, March 1907.

3. Bishopp, F. C.: *Puss Caterpillar, Effect of Its Sting on Man*, U. S. Dept. Agriculture Circular No. 288, September 1923, 14 pages.

which lasted from three days to a week or more. The cocoon spun by the caterpillar was gently rubbed on an area of the forearm of these subjects and a similar eruption appeared. The tuft of hair at the tail of the female moth evoked similar reactions in all the subjects. The universal occurrence of a reaction bespeaks a specific skin poison as the causative agent rather than an allergic mechanism. The plumose appendages of the caterpillar, its cocoon, and the tuft of hair at the tail of the moth all have long and short hairs with minute, sharp-pointed barbs along their length. While the caterpillar crawled up and down the forearm and palm, no reaction occurred on the palm or on the most hairy portions of the extensor surface of the forearm. Apparently, the tough, thick, corneous layer of the skin of the palm or the absence of follicular openings in this part of the human body prevented penetration of the skin by the barbs of the caterpillar appendages. It was noted that the caterpillar never actually touched the skin of the hairy part of the forearm but merely crawled along on top of the hair. The severest reactions occurred at the bend of the elbow and at the wrist where the skin is thinnest. In none of the subjects did a rash occur on any part of the skin where the caterpillar had not come in contact with the skin. To prove that the caterpillar hairs, when deposited on objects or transferred indirectly, may cause an eruption, the caterpillar was allowed to crawl on the inside of a shirt and down the sleeve of the right arm. The insect was recovered and the shirt put on. Within thirty seconds the subject complained of intense itching and within five minutes his back, chest, and right upper extremity were covered with wheals which were present for three hours. When the subject put this shirt on ten days later, a similar though milder reaction occurred. After laundering the shirt, it could be worn with impunity.

The problem was now to establish a chemical or mechanical origin for the eruption. Caterpillars do not bite; so that may be excluded as a factor. The following studies were undertaken.

The heads, which are devoid of hairs, of several caterpillars were macerated and extracted with saline and a drop of the extract placed on the skin of volunteers. No reaction occurred until the skin was scarified, when immediately a wheal appeared with a typical flare reaction. After removal of the alimentary canal of these beheaded caterpillars, the skin bearing the hairs was macerated and extracted with saline. A drop of this extract placed on the skin caused no reaction until scarification was performed. A dead caterpillar kept in contact with skin for twenty-four hours by means of cellophane and adhesive caused a typical urticarial reaction. Caterpillars were then soaked in saline and pure alcohol for eighteen hours and the fluid filtered. Patch tests were performed with the saline and alcoholic filtrates. They were read after twenty-four hours, and there was no positive reaction. These studies indicate that no secretion or excrement of the caterpillar coming in contact with the skin is responsible for the eruption.

In the next experiments, we studied the tuft of hair at the tail of the female moth, which apparently uses this to protect its eggs in oviposition. The microscope showed the tuft to consist of intertwining shreds of long, fine fibrils, interspersed with the same barbed hairs that are found on the caterpillar.

The mass of hairs was soaked in saline, pure alcohol, acetone, and 1 percent solution of potassium hydroxide for twenty-four hours and then thoroughly dried and gently rubbed into the forearms of the subjects, all of whom had reacted positively to the untouched hairs. Similar reactions took place again. Baking the hairs for twenty minutes did not alter the reaction. However, after the clump of hairs was crushed in a mortar with

a pestle, they failed to elicit positive response. Under the microscope in this state the barbed hairs were seen to be broken up and apparently their sharpness dulled. In other words, the nettling properties could be destroyed only by modifying the structure of the hairs.

Two biopsies of affected skin were made, one of a lesion one hour old, the other of a lesion eighteen hours old. Microscopic examination did not reveal the presence of any hairs but showed edema of the corium with dilatation and engorgement of the vessels of the subpapillary plexus with a slight infiltrate of polynuclear leukocytes and lymphocytes. The epidermis presented intra- and extracellular edema. The entire picture coincided with that seen in urticaria. Failure to find the hair in the skin may be due to factors incident to fixing and staining the tissue or may be explained by postulating that the hairs do not break off in the skin but penetrate into the hair follicles. Such a mechanism could explain the transitory nature of the eruption in many instances. In cases where the eruption lasts longer, perhaps the hairs break off in the skin and cure results only after they have been shed by the desquamating epidermis.

#### CONCLUSION

The caterpillar, *Ochrogaster contraria*, its cocoon, and the tail of the moth produce an acute dermatitis by the local inoculation, by means of barbed hairs, of an irritating substance, the nature of which is unknown. The chief manifestations of the eruption are erythematous macules that quickly progress to wheals and in fading leave many intensely pruritic papules.

The condition must be differentiated from urticaria due to allergy and from insect bites, scabies, and dermatitis venenata. Treatment is palliative by means of simple antipruritic remedies. Eczematogenous agents are best avoided. The recognition of the condition will prevent future outbreaks by directing a search for contaminated clothing and blankets.



In the NATOUSA antimalarial campaign, an A-20 plane dusts the area of Lake Patria, Italy. Naples. 19 September 1944. Signal Corps photograph.

## BLACKWATER FEVER

### Case Report

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A 36-year-old New Zealander was admitted to a U. S. Army general hospital on 16 February 1945, his third day of illness. The onset and the early symptoms of backache, fever, and malaise were described by the patient as being characteristic of many attacks of malaria which he had experienced during the past six years while stationed in various parts of New Guinea. No suppressive drug had been taken. Thirty grains of quinine failed to provide the usual relief, and the symptoms continued unchanged for the first forty hours. During the night before hospitalization he had a severe chill, vomited many times, and noted that the urine was of a dark maroon, almost black, color.

On admission the patient was alert but weak, exertion tending to cause dyspnea and cyanosis. An icteric tinge to the sclerae was present, and the spleen was palpable two inches below the costal margin. The temperature was 102°, but in a few hours there occurred a paroxysm of chills, fever, and sweating in which it spiked to 105°. The blood pressure was 105/70 mm. Hg. The red blood cell count was 3,240,000 per cu. mm. and the hemoglobin 65 percent. The icteric index was 75 and the N.P.N. 55 mg. per 100 cc. Albumin and bile were present in the black urine, and the benzidine test was strongly positive. Malarial parasites were not found in three thick smears taken at five-hour intervals, but the diagnosis was made on the basis of the signs and the history of malaria.

The red cell count decreased somewhat irregularly until it reached its lowest figure, 1,590,000 per cu. mm., at the end of the first week. Smears showed moderate anisocytosis and poikilocytosis, and marked evidence of red cell regeneration. The erythrocytes possessed normal resistance to hypotonic saline solution. Throughout the illness the white blood count was normal, with the exception of a moderate rise on the sixth and seventh hospital days, which may have been a reaction to intramuscular therapy instituted on the fifth day. Transfusions of 500 cc. of blood given daily from the second to the fifth hospital days, inclusive, were without apparent effect on the falling count. Blood was obtained from different type "O" donors and was carefully cross-matched. Reactions with chills, fever, vomiting, and cyanosis followed immediately after the first and third transfusions. The transfusion time in both instances was forty-five minutes, while the second and fourth transfusions, which were not followed by reactions, consumed ninety minutes each.

During the first week there was an irregular remittent fever which failed to reach 101° on but two days. On three occasions there were chills followed by a temperature of over 104°, but two of these were associated with transfusions. Despite occasional emesis early in the week, large quantities of fluids taken orally were retained. Fluid was administered parenterally as deemed necessary in the form of 5 percent glucose in normal saline and 2 percent sodium bicarbonate in distilled water. The total daily fluid intake was almost four liters. He did not become oliguric at any time, but the urinary output increased as diaphoresis decreased. To maintain the desired alkalinity of the urine, it was necessary to give an average of at least 10.0 gm. of sodium bicarbonate daily. This was well tolerated orally and intravenously. After the third smear for malarial parasites was taken, therapeutic doses of atabrine were administered, 3.2

gm. being given in six days. This was followed by the daily suppressive dose of 0.1 gm. No untoward effects were noted. The patient obtained much benefit from the intermittent inhalation of oxygen with the use of a small mask. This created a feeling of well-being and made breathing effortless. With clinical improvement less oxygen was desired by the patient. During the second half of the first week, while the red blood cells continued to decrease in number, subjective and objective improvement was apparent. The urine cleared, and the icteric index and N.P.N. returned to normal levels. With the apparent cessation of hemolysis and stimulation by liver extract, the red cell count rose to 2,440,000 per cu. mm. by the end of the second week. A more abundant diet was furnished, and the patient's appetite and strength progressively increased. By the end of the fourth week the red cell count had reached 3,550,000 per cu. mm.

Discussion

Investigators agree that blackwater fever usually occurs in individuals who have suffered from repeated attacks of malignant tertian malaria. Since *Plasmodium falciparum* is relatively vulnerable to the action of atabrine, it is not surpris-

TABLE I  
Case of blackwater fever: Laboratory data and medication

Hospital day	1	2	3	4	5	6	7	8	9	10	11	12	13	14
R.B.C. million per cu. mm.	3.24 3.26 3.40	2.13 2.64	2.46 2.50	2.45 2.13	1.84 1.71 2.10	2.18 1.71	1.59 1.82	2.45 2.06	2.45	2.45	2.23	2.52		2.44
W.B.C. per cu. mm.	8,750	6,050	5,800	6,500	4,250	11,500	14,500	9,700	10,500		8,050			
Urine color	Black	Maroon	Dark amb.	Maroon	Amber	Yellow	Amber	Yellow	Amber	Yellow				
Reaction	Acid	Acid-alk.	Alk.	Neutral	Alk.	Alk.	Neutral	Alk.	Alk.	Alk.	Alk.			
Albumin	4+	4+	1+	Neg.			Neg.							
Bile	Test pos.		Test neg.	Test neg.										
Benzidine														
Icteric index	75			18		15	8							
N.P.N., mg. per 100 cc.	55	56	36	33	34		30							
Fluid intake	4,000	4,730	3,250	3,520	3,900	4,220	3,440	4,350	3,580					
Output, cc.	2,050	2,600	1,900	1,775	2,250	3,050	2,765	3,275	2,600					
Blood trans., cc.		500	500	500	500					5.0	3.0			
Sod. bicarb., gm.	13.3	10.0	3.0	15.0	5.0	5.0	15.0	5.0	5.0	5.0				
Atabrine, gm.	1.0	1.0	0.3	0.3	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Liver extract, units					50	50	50	50	10	10	10	10	10	10
Iron (ferrous), gm.					4.0	4.0	4.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3

ing that blackwater fever is rare among troops. No report was found of its occurrence in an individual taking a suppressive drug in doses considered adequate. As a precipitating cause, quinine has been incriminated more often than other plasmodicidal drugs, but cases have been reported in which no medication of any kind had been taken.

The mechanism which brings about hemolysis is not understood, but a hemolysin has been postulated by many workers, which, according to one explanation, is liberated from parasites by antimalarial drugs. It is believed by some that the hemolysis represents an acute allergic reaction, the result of acquired supersensitivity to malarial protein. The hemoglobinuria of blackwater fever is differentiated from paroxysmal hemoglobinuria and from that which results from drug idiosyncrasy, but Foy and his associates<sup>1</sup> reported a case of acute massive intravascular hemolysis following the administration of a sulfonamide in which the pigment metabolism and pathologic findings very closely resembled those of blackwater fever.

It is impossible to say how many hemolytic episodes occurred in the case under consideration. A noteworthy fact is that at the end of the first week when the erythrocyte count was 1,590,000 per cu. mm. the patient's condition was substantially better than on admission when the count was 3,240,000 per cu. mm. Also, while beneficial effects of the transfusions were apparent clinically, they were not reflected in the falling erythrocyte count. These observations would suggest that the entire damage to the red blood cells was done at the outset, and that the relatively few useful cells increased, while the many injured cells were hemolyzed over a period of several days.

There is reason to believe that alkalization is indicated in the treatment of blackwater fever, although evidence is accumulating which indicates that the urinary suppression which sometimes occurs results not so much from mechanical blockage of renal tubules by hematin precipitated from an acid urine, as from certain physiological and chemical disturbances which affect renal function.

1. Foy, H., Gluckman, J., and Kondi, A.: Pigment Metabolism and Renal Failure in Acute Sulfonamide Haemolysis Resembling Blackwater Fever, *Tr. R. Soc. Trop. M. Hyg., Lond.*, 37:303-319, March 1944 (as reviewed by Murgatroyd, F.: *Tropical Diseases Bulletin*, 41:651, 1944).

## STEREOSCOPY OF PHOTOROENTGEN FILMS

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Photoroentgen films from room 1 of the x-ray department of the separation center at Fort Sheridan showed excellent stereoscopic effect, while those from room 2 showed poor stereoscopic effect together with reversal, so that it seemed as if the patient were facing the observer instead of having his back to him. This impression was obtained by each of a dozen or so persons tested with the two sets of films. It was not due to difference in the amount of tube shift calculated according to the valuable article by Lieut. Colonel L. M. Garrett, in *The Bulletin* of November 1944, page 117, entitled "Roentgen Stereoscopy."

An explanation of this phenomenon was found in the following facts:

In room 1, the tube-shift and the cassette-shift were in the same direction, namely, upwards. In room 2, because of the fact that the tube-stand and the photoroentgen unit were made by different manufacturers, the tube shifted up, while the cassette-shift was downwards.

To understand why this resulted in defective and partially inverted stereoscopy, the following reasoning was used:

Sgt. Arthur D. Goodman and T/4 Lucien M. Meredith assisted in determining the incorrect direction of shift as the cause of poor stereoscopy.



To explain why one sees depth, it is helpful to assume that each position of the tube represents one of our two eyes. Assume that the lower position of the tube is the right eye. If the reader will, in his mind's eye, place himself standing where the tube is when a photoroentgen film is to be made, then cock his head so the right eye is vertically below the left eye, then close the left eye and look at the patient, the outer canthus of the right eye will be in relation to the diaphragm of the patient, while the inner canthus of the right eye will be in relation to the head and neck of the patient. This represents one of the two conditions to be met when viewing the film in the orthostereoscope.

The other condition is, that the film which the right eye (the lower position of the tube) took, should be so situated in the stereoscope that it is actually viewed by the right eye. It must be remembered that the right eyepiece of the orthostereoscope cannot convey any vision from the left half of the light-box of the orthostereoscope.

On attempting to follow out this supposed logic in practice, it was found possible to do so with films from room 1, but impossible to do so with the films in the condition in which they came from room 2. However, this reasoning led to the idea that if the film were cut in half and each half moved sideways to occupy the other half of the orthostereoscope viewing box, the conditions would be fulfilled, and the perception of depth should be improved. This was done and a remarkable change was apparent. Each film so treated exhibited not only a reversal of the image to the dorsoventral position, but the perception of depth was greatly improved. This was tested with numbers of films and with several different observers, and general agreement was reached on the remarkable improvement obtained by cutting and reversing the films.

Other institutions may be getting poor stereoscopy and therefore a lessened efficiency of roentgen diagnoses because of the fact that the tube-shift is up while the cassette-shift is down, or *vice versa*. It is easy to correct the situation by reversing the cassette-shift, in accordance with the manufacturer's instructions.

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## EVALUATION OF BONE-CONTINUITY BY SOUND CONDUCTION

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Percussion of the patella with simultaneous auscultation over the symphysis pubis has been used to determine continuity of bone in fractures of the femur. The method to be described uses a source of sound which, unlike percussion, is constant, more prolonged, and penetrating. This permits more accurate comparison with the control or normal side and extends the use of the method to extremities completely encased in plaster, traction apparatus, splints, or combinations of these.

The instruments required are an ordinary medical tuning fork and a stethoscope. The tuning fork of a frequency of 128, 256, or 512 may be used. The fork of 512 frequency, being larger, vibrates for a longer period of time. Either the bell- or diaphragm-type stethoscope may be used; the latter is somewhat more sensitive and is, therefore, preferable.

The technique consists in auscultation over a bony prominence proximal to the fracture while simultaneously holding the previously struck tuning fork over a bony prominence distal to the fracture. The sound thus transmitted is then compared in intensity to the sound transmitted between the same two points on the uninjured side, the latter being held in about the same position as the affected limb.\*

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\*Reference to any previous authors in this field could not be cited since the literature was inaccessible.

In fractures of the tibia the tuning fork may be placed over either malleolus, if exposed, or at the tip of the great toe. In the latter case, the toe should be steadied between the fingers of the left hand while applying the fork with the right hand. When available, the stethoscope is applied to the patella. Should the knee be covered by a cast, auscultation may be performed at the symphysis pubis, provided the femur be intact.

In fractures of the femur, the symphysis pubis and patella are the usual bony points selected when the patient is in traction. However, any bony prominence about the knee joint may be used and the anterior superior spine of the ilium or greater trochanter of the femur may be substituted for the symphysis when the latter is inaccessible or covered with a heavy layer of fat or hair. When the lower extremity is encased in a spica, the usual two points selected are the symphysis pubis and the tip or nail of the great toe.

In fractures of the humerus which are in traction the olecranon process and acromion may be used. When a cast is present, the tip of the thumb or either styloid process may be selected for application of the tuning fork. Should the acromion be covered by a spica, auscultation may be performed over the manubrium sterni although the latter is much less satisfactory because of diminution in sound conduction through the clavicle.

The presence of padded casts does not interfere with the method provided the vibrating or auscultatory apparatus does not come in contact with the cast. This has been proved by tests taken in the same subjects before and after application of casts without change in position of the bone fragments. Likewise, Thomas splint and traction apparatus, both skeletal or skin traction, do not cause artefacts in conduction. The application of a Lane plate does not per se alter the conduction of sound in well-opposed fractures. Apparent lack of conduction (false negative) may be induced by large joint effusions in the line of the conducting pathway although moderate-sized effusions in the knee joint do not interfere. This is probably due to maintenance of apposition of the tibia and the femur by the cruciate ligaments. A false negative may also be present, even with good bony contact, when the method of fixation consists of a Steinmann pin through either fragment with incorporation of both pins in plaster. Excessive edema or fat over a bony prominence may also be the cause of abnormal diminution in the intensity of transmitted sound.

Good transmission of sound in the presence of poor bony contact has occurred in some cases of supracondylar fractures of the femur when the tuning fork was applied to the patella. In the latter instances, the sound was transmitted by contact between the patella and the upper fragment. In supracondylar fractures, the tibial tubercle should be used for application of the tuning fork or any other bony prominence below it. The only other examples of falsely positive conduction in our experience have been in fractures immobilized by the Roger-Anderson technique. In these cases sound has been transmitted through the pins and rigid extension bars of the apparatus. Evaluation of bony continuity by means of sound conduction should not be attempted therefore in the presence of external fixation by means of the Stader, Roger-Anderson, or similar apparatus.

#### Principles Involved

The only sound-conducting structures in the body consist of the rigid framework—bones and cartilage. We have experimented with all of the soft tissues and found a uniform lack of sound conduction. Sound appears to be transmitted by longitudinal vibration in the long axis of the bone. This would account for the dampening effect of double-pin plaster fixation which prevents longitudinal motion of the fragments. The spongy structure of normal bone probably acts as a resonating mechanism for the frequencies used in this test. This fact accounts for individual variations in normal

sound conduction as measured by the method and emphasizes the need for control observations on the normal side. Thus, individuals with denser, less porous bone tend to transmit sound more poorly than those with normal bony architecture. Sound passes through joints with only slight diminution in intensity as can be proved by auscultating at a fixed point such as the symphysis pubis while alternately activating the femoral condyle and tibial tubercle with the sounding device. There is little difference in intensity because of good bony contact within the joint. As long as joint effusions do not cause the articulating surfaces to separate, sound is transmitted.

Of course, there is a diminution in intensity of the sound in proportion to the distance between the tuning fork and stethoscope. Consequently the shorter distances are preferable, when possible. An interesting method of quantitative measurement of bone conduction is based on this principle; e.g., in a given case of fracture of the shaft of the femur sound transmission may be barely audible from the corresponding patella as compared to good transmission from the big toe on the normal side. After several weeks of traction it will usually be found that sound transmission improves on the injured side so that the sound becomes audible from the tibial tubercle and later on from progressively distant points on the subcutaneous anterior border of the tibia. Eventually sound transmission is equal from both big toes. Thus, by means of chronological observation of the most distant bony point from which sound is heard, the progress of union may be followed in the absence of significant roentgenological changes.

The absence of sound conduction in fractures is due to the presence of a soft, nonconducting material (blood clot, fibrous tissue, muscle) between the fragments. Under these circumstances the longitudinal vibration of one fragment cannot be transmitted to the other fragment or fragments. With partial contact, sound transmission is roughly proportional to the percentage of normal contact which is present. As the interval between the major fragments becomes filled in with rigid tissue during the process of repair, sound begins to be transmitted in increasing intensity until it cannot be distinguished from the normal side. This commences as soon as osteoid tissue is laid down, even before there is roentgenological evidence of calcium deposition. It is thus possible to forecast the appearance of callus by means of auscultation one or two weeks before it can be demonstrated roentgenographically. These observations have been proved by cases which came to open operation.

The method has been found useful chiefly in fractures of the tibia, femur, and humerus and to a lesser extent in those of the clavicle and phalanges. The technique is not of value in fractures of the radius or ulna because of conduction by the opposite bone. Likewise, in fractures of the fibula conduction by the tibia interferes; however, an intact fibula will not interfere with the method in fractures of the tibia. The latter, by reason of its bulk and sole articulation with the femur seems to comprise the main sound-conducting pathway of the leg. Fortunately, isolated fractures of the fibular shaft seldom pose serious clinical problems of alignment or union. The method is not applicable to fractures of the tarsals, metatarsals, bones of the ankle mortise, carpals, metacarpals, cranium, vertebrae, or ribs, because of their multiplicity of articulations which furnish alternate sound-conducting pathways.

A study of sound conduction was made in a large number of all types of fractures of all degrees of severity of the long bones. The majority were compound fractures in battle casualties. Serial observations were performed in most cases. Too much emphasis cannot be placed on the necessity for repeated observations, since most useful information is derived from changes in sound conduction rather than from a single observation.

This study showed that (1) nontransmission of sound occurs in complete loss of bone continuity due to loss of substance, distraction, interposition of soft parts, and marked comminution without appreciable contact of the fragments. (2) Partial transmission of sound is due to partial contact of the major fragments and occurs in fresh transverse fractures with partial contact of the major fragments; fresh comminuted fractures with bridging of the major fragments by smaller fragments; fresh fractures in normal alignment but with slight separation of the fragments; healing fractures in which gaps between the major fragments have partially filled in with osteoid tissue or callus, and fractures with delayed union. (3) Normal transmission of sound occurs in fissure fractures, fractures without appreciable separation, impacted fractures, healed fractures of types described in (1) and (2) above.

### Conclusions

The method of sound conduction in evaluation of bone-continuity is merely a clinical aid and must be used as such. Like all other technical data, including the x-ray, sound-conduction readings must be evaluated in conjunction with the clinical picture and other laboratory findings in order to be significant. Sound-conduction findings alone are not diagnostic of the presence or absence of fracture nor do they yield information concerning the presence or absence of angulation. A single positive observation of normal bone conduction is the least informative since such an observation is compatible with a fresh fracture in which there is good bony contact. Moreover, healing of such a fracture cannot be followed by this method because sound conduction is normal from the very outset. Fortunately this does not materially impair the usefulness of the technique inasmuch as fractures exhibiting good bony contact from the onset rarely pose any diagnostic or prognostic problems. A single observation of diminished or absent conduction is always of diagnostic significance, but is not as useful as serial observations taken days and weeks apart. Thus, progressive diminution in conduction in a case being treated in traction is characteristic of distraction. Rapid progressive improvements in a fresh fracture in traction indicates improvement in bony contact. Improvement in conduction in an immobilized fracture of several weeks' duration is presumptive evidence of callus formation even before x-ray evidence is apparent. This is particularly valuable in comminuted fractures when clinical union usually confirms this observation. Persistence of complete absence of sound conduction for several weeks in a fracture with but slight separation of fragments has, in our experience (as proved by open operation), been very strong evidence of interposition of soft parts.

The method is valuable because of its simplicity and rapidity as well as its applicability when the x-ray may not be easily available. Thus, for cases in traction, portable x-rays will not be needed as frequently because of the fear of distraction. The latter may be detected easily by utilizing this method. The ease with which the progress of union may be followed and the early detection of callus, as well as help in the diagnosis of interposition, make the test a useful adjunct in the treatment of fractures of all types.

The test should be used in conjunction with the x-ray and clinical findings to achieve its maximum usefulness. Familiarity with the technique is essential before attempting to draw any conclusions; but this is easily acquired with practice. Recorded serial observations in terms of percentage of normal sound transmission furnish the most valuable diagnostic and prognostic information.

## MAXILLOFACIAL BANDAGE

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The numerous methods advocated for the dressing and support of the tissues of the face and jaws, in the field and in transport, indicate that no one completely satisfactory method is now in use.

In this division we have sought for more than four years to develop one that would meet the following requirements: (1) positive and controlled support of the injured tissues; (2) capable of *instantaneous removal and reapplication* by attendant or, if conscious, the patient himself; (3) simplicity in teaching and in application; (4) requiring little or nothing in the way of material over and above present Tables of Equipment.

We have developed a bandage which meets these requirements. We make no claim for originality.

The materials required are: roll of 6-in. medium dental rubber dam; 1-in. roller gauze bandage; safety pins; 4- by 8-in. sponges or similar materials (Carlisle bandages may be used, though bulky).

Except for the rubber dam which is no longer an item of issue to field units, all materials are standard issue. From our experience one roll of dental rubber dam per battalion aid station would be sufficient.

### Application of Bandage

A suitable length of rubber is cut from the roll. Several 4- by 8-in. or similar sterile dressings are placed over the injury and carried under the jaw to the opposite side. The dam is folded lengthwise once, reducing its width to three inches. It is placed under the mandible and carried up over the face just anterior to the ears, thence over the vertex and when the desired tension is obtained the rubber is secured by one or two safety pins. A one-inch roller bandage is then passed several times about the head and the rubber stabilized by pinning the gauze to the rubber over each temple (figures 1 and 2).

The advantages of this bandage are: (1) it can be quickly applied; (2) pressure is uniform and constant; (3) can be released if necessary and reapplied; (4) it holds torn tissues, both hard and soft, snugly and firmly so as to reassure the patient and it tends to control hemorrhage and edema; (5) it does not loosen with wear and stress; (6) traction appliances when indicated can be used in conjunction with the bandage.

The suggested disadvantages are: (1) difficulty in breathing as a result of edema; in our cases we met with none; (2) macerations of the skin under the rubber; though in two instances, patients wore the appliance in the tropics for periods of two and four weeks respectively, neither suffered any injury to the skin; on questioning both stated that they were comfortable; (3) the elastic rubber would displace medially mandibular fragments when substantial portions of the symphysis are lost, thus leading to a complete collapse; however, we have not as yet had the opportunity of treating such cases; nevertheless we have devised an improvised method which would seem to be the solution.



FIGURE 1. New type bandage for maxillofacial injuries secured by coronet bandage (front view).

We cut from C-ration cans, or other suitable materials, metal "chin cups" fashioned to fit the case. This cup is padded and placed under the mandible so that its bent edges protruding on either side take up the lateral pressure of the rubber and prevents the bandage from "squeezing" the mandible.

### Case Reports

CASE 1. A soldier fell through open hatch aboard ship at sea and sustained a compound bilateral fracture of mandible through the symphysis with marked lingual displacement of the fractured segment, and a lacerated tear through the soft tissues of the chin from the vermilion border to the inferior margin of the mandible in the midline; simple fracture of right femur, and Colles' fracture of right wrist. The maxillofacial management comprised: (1) the edges of the laceration and its depth



FIGURE 2. Side view.

were impregnated with sulfanilamide crystals, 5 gm., and closed with three interrupted black silk sutures; (2) rubber dam maxillofacial bandage was applied and the displaced fragment secured to an improvised wire traction cage through the use of brass ligature and rubber bands; (3) patient was evacuated by boat to shore installation.

This case illustrates the advantage the rubber-dam bandage possesses over other types. En route to shore the patient vomited. The bandage, including the traction, was released instantly and the patient emptied his stomach. Fresh dressings were applied and the bandage quickly reapplied. Later, while in the ambulance, the same procedure was repeated. The patient arrived at the shore installation in good condition.

CASE 2. A soldier on Eniwetok Atoll sustained multiple penetrating and perforating grenade fragment wounds of the face; compound fracture of the mandible through the right lateral incisor region; horizontal deep laceration above right eye just beyond the brow, about 3 cm. in length; laceration of right cheek from right labial commissure to just under the right orbit at its center; lineal tear of the soft tissues of the chin from the vermilion border of the lower lip to the inferior margin of the mandible just to the right of the median line; perforating puncture wound of left cheek; entrance 2.5 cm. below lateral ocular commissure of left eye, exit just below and behind left ear. Missile damaged Stensen's duct. Saliva was discharging through the wound back of the ear; large hematoma under right eye; possible detachment of the retina; fracture of 5th metacarpal of left hand; shock.

The maxillofacial treatment comprised application of rubber-dam bandage over sterile petrolatum gauze dressings. Wire traction cage applied and fragment secured to it by means of brass wire ligature and rubber bands.

The next day, the facial wounds were débrided carefully, impregnated with sulfanilamide, 5 gm., and with interrupted black silk sutures were closed. Sulfanilamide, 2½ gm., was instilled into the track of the perforating wound of the left face and through-and-through petrolatum gauze



drain inserted. The whole was then dressed with sterile petrolatum gauze and the patient returned to the ward. The following day the jaws were wired, using arch-bars on maxilla and mandible and utilizing orthodontia rubber bands for reduction and fixation. This was augmented by the rubber-dam bandage both for additional stability and to secure the dressing. Patient evacuated by water to the base.

This case illustrates use of the bandage as an emergency appliance for splinting the jaws and as an adjunct in treatment as well as a very good means of securing dressings.

We believe that the rubber-dam bandage is superior for the treatment of maxillofacial injuries in the field and for transport. We found it an excellent means of controlling hemorrhage and limiting edema. It has served as a convenient and valuable adjunct in connection with more definitive measures.

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## ISOLATION OF SALMONELLA TENNESSEE FROM FROZEN WHOLE AND POWDERED EGG

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*Salmonella tennessee* (VI, VII; Z29) has been found three times in healthy human carriers, and four times in sick persons.<sup>1 2</sup> No other reference to finding this type *Salmonella* has been found in the literature. During an investigation on the occurrence of *Salmonella* in powdered egg with a moisture content not exceeding 2 percent, four cultures of *S. tennessee* were encountered. On 9 October and, on 17 October 1944, lots of powdered egg yielded *S. tennessee*. The powdered egg in both instances originated in a drying plant in Iowa. The frozen whole egg which went into the production of these powders was traced to egg breaking plants in Iowa, but had not been examined for *Salmonella*.

On 15 November 1944 a culture of *S. tennessee* was again encountered in a powder originating from a Nebraska egg drying plant. The frozen whole egg used in production of above powder was examined at this time and yielded apparently a pure culture of *S. oranienburg*. In addition to *S. oranienburg*, *S. tennessee* was also isolated from the powder. The frozen whole egg was traced to a Nebraska egg breaking plant. The same Nebraska egg drying plant was the subject of another study on 25 November 1944. *S. tennessee* was recovered from frozen whole egg which was traced to an egg breaking plant in Nebraska. The explanation for not finding *S. tennessee* in the frozen whole egg on 15 November 1944 may have been due to overgrowth by *S. oranienburg* or to insufficient number of colonies picked for biochemical observations.

### Conclusion

Four cultures of *S. tennessee* (VI, VII; Z29) were isolated from both frozen whole and powdered egg with a moisture content not exceeding 2 percent. The evidence establishes Iowa and Nebraska as sources of these organisms, which so far as is known have not been previously reported in the midwestern states. The implication is that fowl may, as in the case of many other salmonellae, be the source of this type *Salmonella*.

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Captain Oliver H. Peterson, Sn.C., Second Lieut. Thais A. de Tienne, W.A.C., and Technical Sergeant Berley Firmin assisted in this work.

1. Bruner, D. W., and Edwards, P. R.: Two New *Salmonella* Types with Undescribed Flagellar Antigens, Proc. Soc. Exp. Biol., N. Y., 50:174-175, May 1942.

2. Seligmann, E., Saphra, I., Wassermann, M.: Occurrence of Some Unusual *Salmonella* Types in Man, Including a New Type, *Salmonella georgia*, Ann. J. Hyg., 40:227-231, Nov. 1944.



## IMMOBILIZATION OF CERVICAL VERTEBRA FRACTURE IN TROPICAL CLIMATE

MAJOR EMIL J. BUNATA

Medical Corps, Army of the United States

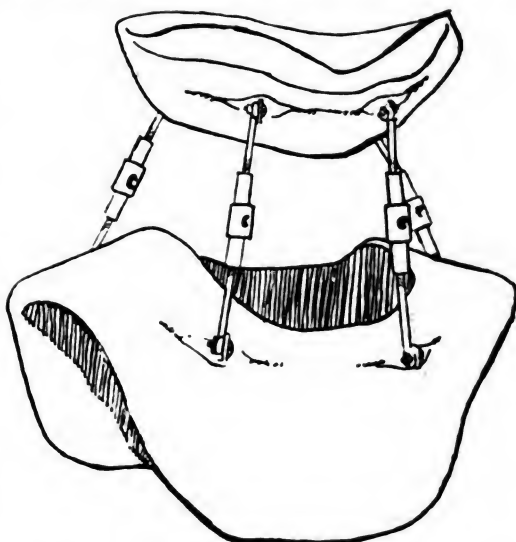
This report is based on two cases of fracture of cervical vertebra, one a fracture of the neural arch of the 3d cervical vertebra, the other a compression fracture of the anterior portion of the 6th cervical vertebra.



In the first case the injury resulted from a fall in which the patient landed on his shoulder and left occipital region, causing an acute flexion of the neck. The second case resulted from diving into shallow water with the neck in slight flexion.

The first case was seen immediately after injury but, because of poor x-ray visualization on early films, a fracture was not seen; however, the patient was treated for a possible fracture of a cervical vertebra because of pain in cervical region on motion. About eight days after initial injury the patient was x-rayed again and a fracture of the neural arch of the 3d cervical vertebra was found. No traction was applied nor was any manipulation attempted as the vertebra did not appear dislocated and the fragments were in good approximation. The patient re-

mained on a flat surface until immobilization was applied. Because of climatic conditions, this officer was reluctant to apply the usual type of cast applied to cervical fractures. An apparatus was made consisting of a plaster of paris yoke and occipito-mandibular support connected by three 4-inch turnbuckles which could be expanded to 6 inches when fully opened. By incorporating small right-angle brackets into both the plaster of paris portions, these could be connected with the turnbuckle. After the apparatus was completely assembled, sufficient traction could be applied and maintained indefinitely. By expanding the turnbuckles, added traction could be applied without any discomfort to the patient with the exception of a sense of stretching. All bony prominences were padded with orthopedic felt padding to prevent pressure ulceration. With this appliance the patient was free to move about at will



and was very comfortable because a minimum of the body was covered with a cast.

The second case was treated similarly except this patient had developed pressure necrosis of the mandibles from a previously applied head halter of narrow webbed strapping. The fact that the upper section of the appliance could be lowered enabled the attendant to keep the pressure ulcers cleansed and treated daily.

The second appliance made consisted of four turnbuckles. This was done as an experiment to determine whether three or four turnbuckles would be more effective. No difference was found and the one with three turnbuckles was as stable as the one with four. With this appliance, both patients were kept comfortable in spite of the heat and humidity in this area, and the head and cervical spine were maintained in absolute immobility. The proper curvature of the spine was also maintained in a normal position. By adjusting the turnbuckles, any degree of extension or flexion can be attained as well as any degree of traction.

### INSTRUMENT TO FACILITATE MULTIPLE LOOP WIRING IN FRACTURES OF JAW

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Multiple loop wiring with elastic traction is an effective means for the reduction and fixation of fractures of the jaw. The instrument to be presented simplifies the application of multiple loop wiring. The essential



FIGURE 1

feature of the instrument is a tapered and angulated head, which acts as a hook to engage the lingual wire as it bends back over the buccal wire into the interproximal space. The wire slips down to the butt of the hook and then by rotating the instrument the eyelet

is formed. The instrument was made by altering the head of a dental tool and adding a handle. Figure 2 is a schematic representation of multiple loop wiring and illustrates the practical application of the instrument. An outward pull, carried either in an upward or a downward direction, is exerted, depending on whether the mandible or maxilla is being wired. This carries the wire deeper into the embrasure, and then a sufficient number of turns are made to adapt the wire securely around the tooth. As the instrument is withdrawn, the eyelet is bent in the desired direction. For the final tightening after all the eyelets have been formed they are re-engaged and an additional turn or two given.

This instrument serves both to form and tighten the loops. The long thin shaft permits good observation and manipulation within the mouth particularly in the region of the molar teeth. The wire will not slip off the hook because of the angulation. The tapered end allows the instrument to be disengaged readily. The eyelets may be easily engaged at any time for additional tightening.

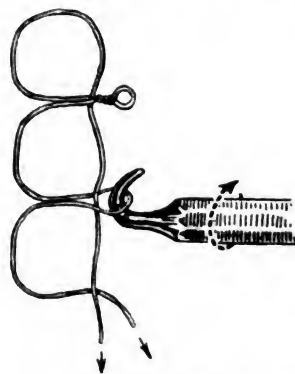


FIGURE 2

## PEDICULOSIS PUBIS: TREATMENT WITH DDT IN COLD CREAM

MAJOR RICHARD L. SUTTON, JR.

Medical Corps, Army of the United States

A method of treating pediculosis pubis is submitted with the opinion that it is efficient, harmless, cheap, and free from nuisance features. Larvicide, DDT, powder, dusting (Stock No. 51-L-122) is incorporated in cold cream<sup>1</sup> in a concentration of 0.5 percent DDT.<sup>2</sup> This is dispensed in half-ounce (15-gram) containers. When the diagnosis of pediculosis pubis is established, the patient is given one-half ounce of 0.5 percent DDT in cold cream and is instructed to rub in a thin layer of this ointment under the arms, over the hairy chest, about the genitalia and anus and over the hairy thighs and legs, even to the ankles in hirsute patients. A thin layer is adequate. He waits twelve hours, then takes a bath with soap.

Experience has shown that itching stops within 30 minutes, when pediculi are found to be dead; nits do not hatch, and irritation does not occur.

Advantages of this method of treatment are: (1) the medical officer spends one minute on any given case, (2) no spray or dusting is required, (3) no reapplication after one week is necessary, (4) after the ointment has been prepared by the pharmacy, no further expenditure of time by military personnel is requisite, and (5) the patient remains on duty, expending of his time only the few minutes required to apply the ointment and later to wash it off.

### 1. Composition of cold cream:

Sodium borate	4.5
White wax	70.5
Mineral oil	310.0
Water	115.0

Heat the wax and mineral oil to mix in one container. In a separate container dissolve the sodium borate in hot water and add water to make 115. Allow both solutions to reach the same temperature, then mix with stirring.

### 2. Formula for ointment:

Larvicide, DDT, powder, dusting	7.5
Cold cream	150.0

Dispense in cans each containing 15 grams.

Sig. 0.5 percent DDT in cold cream.

## A TRACTION SHOE CLAMP

LIEUT. COLONEL SAMUEL R. TERHUNE

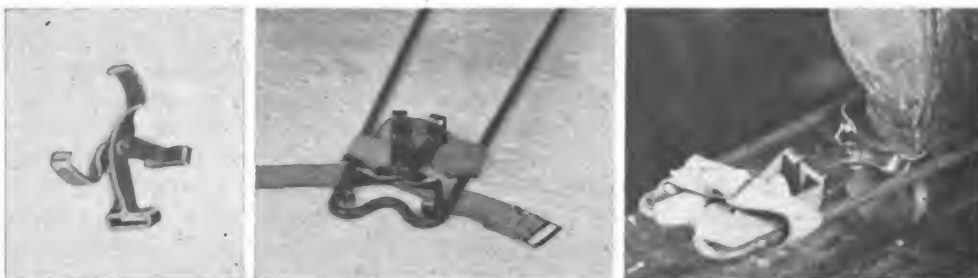
Medical Corps, Army of the United States

The traction shoe clamp illustrated was designed to use in conjunction with the Army half-ring and Thomas full-ring leg splint in the field as an emergency traction apparatus for transportation of patients with fractures of the lower extremities. It was constructed by John W. Hudachek, civilian orthopedic mechanic.

The clamp can be applied quickly to any shoe without having to adjust wing nuts, turnbuckles, springs, or screws, and without any special equipment or tools. The leg splint with which it is to be used does not have to be changed or remodelled, provided it is longer than the extremity to which it is being applied. This shoe clamp will work efficiently in every case regardless of the length of the strapping necessary to fasten the handles to the distal end of the splint.

This clamp has been tested extensively on detachment personnel on many occasions. It can be used on either leg, on any length subject, and the force of traction does not produce any undue pressure over the dorsum of the foot. Adjustments are not necessary to fit any size shoe and the thickness of the sole of the shoe has no effect on its efficiency.

We feel that a spring, distal to the clamp, should not be employed as this would further complicate its application and the clamp is not designed to be used as definitive treatment for reduction of fractures. Hand traction on the web strap, sufficient to hold the leg in proper alignment, is easily accomplished. Then the strap ends are crossed over the distal end of the splint and the buckle is fastened. The traction can be



varied at any time by either tightening or loosening the straps at the buckle. The web strap with the shoe clamp threaded on it can be buckled around the stock leg splint and become a part of the splint, as far as the supply section is concerned, with little danger of losing the apparatus.

The Hudachek shoe clamp and stock leg splint can be quickly and easily applied to a fractured leg and will maintain the leg in firmly fixed extension. This provides all necessary comfort and safety for the casualty during evacuation to a hospital.

## A SYSTEM FOR AN EFFICIENT TRANSFUSION SERVICE

MAJOR JESSE E. EDWARDS

Medical Corps, Army of the United States

The following system for the transfusion work-up of patients arriving in convoy has proved efficient at an Army general hospital in the European Theater of Operations. It has not only avoided confusion but has allowed for the study and transfusion of patients in conformity with their relative needs.

After discussion with the clinical services, a priority classification was developed: Class "A" patients are those on whom the requested tests might point to an immediate lifesaving procedure. Class "B" patients are those who require prompt study and therapy but whose state of urgency is not so great as that of patients in the first group. The work on these is done as soon as possible, but if there are any class "A" requests outstanding, the latter come first. Class "C" patients, who, while they may be ill, present no degree of urgency. Class "C" requests are ordinarily attended to during duty hours, the bed patients first, then the ambulatory.

The request slips sent to the laboratory bear the appropriate classification designation in the left, upper corner. The priority classification as outlined above is employed not only for studies relative to transfusion, but for all procedures requested on convoy patients.

### Anemia and Hypoproteinemia

In dealing with newly arrived casualties, many of whom have lost blood, one of the major problems is whether the patient is anemic and/or hypoproteinemic. When the problem as to whether or not a patient needs a transfusion is present, the ward officer requests "shock study" which consists of determination of hemoglobin, hematocrit, and total protein. The laboratory technician draws 5 cc. of venous blood and adds this to a

screw-cap bottle of 10 to 20 cc. capacity, containing 0.5 cc. of a dried solution of 1.2 percent ammonium oxalate and 0.8 percent potassium oxalate. The bottle has a paper sticker attached. On this the technician writes the patient's name, Army serial number, and blood type as indicated on his identification tags.

The technique for obtaining the requested results is the Van Slyke copper-sulfate specific-gravity method.<sup>1</sup> The procedures are carried out as follows: (1) Specific gravity of the whole blood is obtained. (2) If the value obtained in (1) is 1.052 or less, a red-blood-cell suspension is prepared by adding two to three drops of the whole oxalated blood to a Wasmann tube one-half to two-thirds filled with 2.5 percent sodium citrate in normal saline. (3) The remaining blood is transferred to a Kahn test tube and spun down for five minutes at 3,000 revolutions per minute. The plasma is then pipetted off to a fresh Kahn test tube. (4) The specific gravity of the plasma is determined. From this figure and from the specific gravity of the whole blood, the total protein, hematocrit, and hemoglobin, in grams, are determined with the aid of the published chart. The hemoglobin is reported in grams per 100 cc. as well as in percentage of normal. In combat soldiers it is assumed that 16.5 gm. of hemoglobin per 100 cc. of blood represents 100 percent. The value of hemoglobin in grams when multiplied by the factor 6.0 gives the hemoglobin in percentage. We have a conversion table on hand which does away with the actual multiplication for each test. The results are sufficiently reliable and the system as a whole works so well that total erythrocyte counts are rarely done on battle casualties. (5) At this hospital the chief of the laboratory service is a member of the shock team. On this account and on the basis of an understanding with the surgical service, patients who prove to be anemic with 10 or fewer grams of hemoglobin per 100 cc. of blood are prepared by the laboratory for transfusion without consultation. In the case of patients who are anemic, but with higher values of hemoglobin than 10 gm., the ward officer decides whether or not a transfusion should be done. (6) When the decision is to do a transfusion, the plasma from the original sample is used for cross-matching and for a check on the blood typing. In working with fresh serum or plasma, we prefer to destroy the complement, thus doing away with the possibility of hemolysis in the tests, allowing only agglutination, should antibodies be present. Therefore, in preparing for a transfusion, the plasma is inactivated for twenty minutes in a water bath at 56° C. This treatment of plasma causes coagulation of fibrinogen, producing a cloudy, undesirable preparation. To overcome this, the inactivated plasma is spun down at a speed of about 3,500 revolutions per minute for five minutes and then the clear, supernatant fluid is decanted with one quick motion into a clean Kahn tube which is labeled with the patient's name, serial number, and date on which the sample was taken. (7) In cases which are to have a transfusion for the first time in this hospital, the blood is typed regardless of identification tag or other record. The patient's Rh type is also determined routinely. Once the recipient's blood type and Rh type are determined in this laboratory, these are recorded and the patient is ordinarily not retyped. Should an error be discovered in the blood type as recorded on the identification tags, this fact is made known in writing to the commanding officer, detachment of patients, in order that the soldier's records may be corrected.

1. Phillips, R. A., Van Slyke, D. D., Dole, V. P., Emerson, K., Jr., Hamilton, P. B., and Archibald, R. M.: The Copper Sulfate Method for Measuring Specific Gravities of Whole Blood and Plasma, *Bull. U. S. Army M. Dept.*, 71: 66-83, December 1943.

### Blood Typing

For blood typing we use the tube method (Kahn tube) exclusively and obtain the type by the dual technique of (a) running the patient's cells against known antiserum, and (b) running the inactivated plasma or serum of the patient against known type A and type B cells. In this way, a highly reliable check is made on the blood type determination. The known serum used is dried rabbit serum. This is reconstituted by adding 1.0 cc. distilled water to the amount of dried serum intended for twenty-five tests. The solution is stored in the refrigerator and is ready for use at all times. For the typing of cells two Kahn tubes are used. One is labeled "A," and the other "B." Into the "A" tube, a drop of anti-A serum is added; into the "B" tube a drop of anti-B serum. Then to each tube a drop of the cells to be typed is added. The tubes are shaken for proper mixing and may be centrifuged immediately at 1,000 revolutions per minute for one minute. The tubes are removed from the centrifuge, shaken, and read for presence or absence of agglutination. Unless there are obvious gross agglutinated clumps, the mixture is poured onto a glass slide and the specimen examined under the microscopic. The results of cell typing are interpreted as follows:

Tube "A"	Tube "B"	Blood type
(Contains anti-A serum)	(Contains anti-B serum)	
Agglutination	No agglutination	A
No agglutination	Agglutination	B
Agglutination	Agglutination	AB
No agglutination	No agglutination	O

As stated, a valuable check on the blood typing, as just described, is to run the inactivated plasma or serum of the person in question against known A and B cells. This is done as follows: One Kahn tube is marked "A" and one "B." To each tube is added a drop of inactivated centrifuged plasma or inactivated serum from the person being tested. To tube "A" is then added a drop of a cell suspension of known type A blood; to tube "B" a drop of a cell suspension of known B blood. The tubes are shaken, centrifuged, reshaken, and read for agglutination as for cell typing. The results of typing by the use of serum are interpreted as follows:

Tube "A"	Tube "B"	Blood type
(Contains A cells)	(Contains B cells)	
No agglutination	Agglutination	A
Agglutination	No agglutination	B
No agglutination	No agglutination	AB
Agglutination	Agglutination	O

The blood type as determined by the two methods must check. We have rarely encountered individuals whose cells type out as A or AB, but whose serum agglutinates the known type A cells used in the test. In this group we have found consistent agglutination of three strains of A cells used in this laboratory and consistent failure to agglutinate the fourth strain of A cells. Such reactions are probably to be explained on the basis of subgroup incompatibility. For these individuals it is usually difficult to find suitable units of A blood. Type O blood was cross-matched with these individuals with evidence of compatibility and no reaction on transfusion.

### Preparation for Transfusion

In this hospital, banked blood is used almost exclusively. Types O and A blood are employed. Type O blood is used for all types except type A in which type specific blood is usually donated. With reference to Rh negative recipients, we attempt to obtain Rh negative blood for donation, but we

have also used Rh positive blood after previous transfusions. In all of this group we have found no incompatibilities, nor have there been hemolytic reactions following such transfusions. The importance of the development of anti-Rh antibodies following transfusions of Rh positive blood to Rh negative individuals is recognized. In practice, however, donation of Rh positive blood repeatedly to male Rh negative recipients does not appear to produce out-and-out hemolytic reactions very frequently; nevertheless, in such circumstances the survival of Rh positive cells may be short-lived, thereby nullifying in part the expected result of the transfusion. The blood of Rh negative individuals who have had recent transfusions with Rh positive blood when brought in contact with the anti-Rh serum, may show agglutination. This fact may result in falsely labeling an Rh negative individual Rh positive. It is proper to view with some caution an Rh positive result in individuals who have had recent transfusions with blood of which the Rh type is unknown, especially when the agglutinated clumps are relatively small. If one is using high-titered Rh typing serum and obtains clumping of all the cells, then there should be no doubt that the individual is truly Rh positive. Otherwise, the results must not be viewed with complete security.

For cross-matching, a cell suspension is prepared from within the bottle of blood to be tested. Pilot tubes are not employed for cross-matching purposes. The test is run by adding to a Kahn tube a drop of the recipient's inactivated centrifuged plasma, obtained from the original 5 cc. of blood, followed by a drop of the blood bank red-cell suspension. After shaking to mix, the tube is placed in the water bath at 37° C. If the recipient is definitely known to be Rh positive, the mixture is incubated for thirty minutes. If the recipient is Rh negative, if the Rh type is unknown, or if there is reason to consider a false Rh positive, the incubation should extend for one hour. Following incubation, the tube is centrifuged for one minute at 1,000 revolutions per minute. The tube is shaken to suspend the sediment, and the mixture is poured onto a slide and read under the microscope. If no agglutination is present, the blood tested is considered compatible for transfusion to the individual in question. The transfusions are performed by the ward officers.

We have seen a small number of cases in which a type O Rh positive recipient appeared to be incompatible with all type O blood tested. On further study, these individuals proved to have cold agglutinins in their serum. Evidently, in the presence of a high titer of cold agglutinins, the amount of cooling that took place from the time the tube was removed from the water bath to the time it was read under the microscope allowed for agglutination. In such cases the cross-matching should be centrifuged and read promptly on removal from the water bath and placed on a slide which has been warmed preparatory to the reading. If there is no agglutination with this technique, the blood is considered compatible. However, under such circumstances, when transfusing, it is wise first to allow but 50 cc. of blood to flow into the recipient's vein. If after an interval of ten minutes the patient shows no evidence of a reaction, the rest of the transfusion may be given without concern.

#### Transfusion Reactions

Nonhemolytic reactions characterized by chills and fever have been encountered in about 5 percent of all banked blood transfusions. For some reason, one encounters a patient now and then who develops these symptoms each time blood or plasma is administered. In such cases the author feels that the cause may lie in the patient rather than in the blood, the plasma, or the apparatus; nevertheless, the state of cleanliness of the



apparatus must play an important part in producing reactions. There must be constant vigilance to ensure that glassware and tubing are properly cleaned and rinsed. The sets must be taken apart completely in order to be adequately cleaned. A potential source of trouble is failure to autoclave the set promptly after it is washed and rinsed. Unless there are facilities for drying the component parts immediately after washing and rinsing, and usually there are not, immediately on completion of the washing process, the sets must be made up and autoclaved with no delay.

When a patient is reported to have a reaction, whether urticaria, chills, or fever, an attempt should be made to determine whether or not hemolysis was associated. When a reaction occurs, an icterus index is run as soon as the reaction is reported and the first urine voided after the reaction is examined for color, albumin, hemoglobin, and blood cells. If the transfusion is discontinued, the unused blood is returned to the laboratory where a red-cell suspension is made and cross-matched with the inactivated serum taken for the icterus index determination. Three tubes are set up, each containing a drop of the banked blood cell suspension and a drop of the inactivated serum. Each tube stands for one hour, one at room temperature, one in the refrigerator, and one in the water bath at 37° C. Following this, the tubes are centrifuged for one minute at 1,000 revolutions per minute and the mixture read under the microscope for agglutination.

#### Summary

In this system for the operation of a transfusion service in an Army general hospital, requests for study bear a priority classification in accordance with the patient's condition relative to other patients on hand. With one sample of venous blood, one can determine the level of the hemoglobin, hematocrit, and plasma proteins, one can type the blood, including Rh typing, and cross-match the patient for transfusion. The test-tube method for blood typing is a rapid and accurate one. The dual technique of blood typing, that is, by typing the serum or plasma as well as the cells, serves as a highly reliable method of establishing an individual's blood type. Rh negative individuals who have had recent transfusions with Rh positive blood may give a false Rh positive typing reaction. In patients whose blood is Rh negative, in whom the Rh type is unknown or in whom there is reason to suspect a false Rh positive test, the cross-matching for transfusion should be carried out for an hour at 37° C. Adequate cleaning and preparing of blood transfusion sets will prevent many of the reactions characterized by chills and fever.

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Editorial note.—It has been found, at the Army Medical School, that more rapid and more clear-cut agglutination will result when the dried anti-A and anti-B rabbit sera are dissolved in 0.85 percent, or preferably 2.0 percent, solution of sodium chloride, rather than distilled water.<sup>1</sup> When examining postreaction samples of blood, it is best to draw the first sample within thirty minutes of the onset of the reaction. If the reaction was the result of hemolysis, this sample will show free hemoglobin in the serum. If the serum is free of hemoglobin, the reaction was, in all probability, not hemolytic but pyrogenic. Another sample may be drawn four to six hours after the reaction. This sample will ordinarily show an increase in serum bilirubin if the patient had a hemolytic reaction. The pretransfusion serum used for cross-matching will serve as a control. When blood samples are drawn, care must be taken not to use wet syringes or to handle the blood roughly, thereby producing hemolysis.

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1. Article to be published by Captain John Elliott, Sn.C., A.U.S., Division of Surgical Physiology. Army Medical School, Army Medical Center, Washington, D. C.

## RAPID METHOD FOR PASSAGE OF MILLER-ABBOTT TUBE IN FIELD HOSPITALS

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Use of the Miller-Abbott tube is a fundamental procedure in the treatment of bowel obstruction. The technique of its introduction has been described.<sup>1 2 3</sup> Under the best of circumstances, passage of the balloon beyond the pyloric sphincter within twelve to twenty-four hours may be attained. Frequently, however, because the technical features are insurmountable, the tube never reaches the duodenum. This fact discourages the surgeon from using the only nonoperative method of successful management of bowel obstruction under combat conditions or in fixed installations where x-ray control is inadequate.

A patient underwent splenectomy on 15 February 1945 for nontraumatic rupture of a chronic malarial spleen. Early signs of impending bowel obstruction were noticed on the third postoperative day. Because of absence of vomiting and the passage of adequate stool, the seriousness of his condition was not realized at first. The dangers and difficulties of frequent transportation to the x-ray clinic discouraged the use of the Miller-Abbott tube. The patient's condition improved on the fourth day but, subsequently, distention progressed in spite of the use of Wangenstein drainage. Peristalsis, which before had been hyperactive, was no longer audible. Free intraperitoneal fluid was present. A diagnosis of acute intestinal obstruction was made. Under gas, oxygen, and ether anesthesia the original wound was explored. No single point of obstruction was observed, but loops of distended and relatively normal small bowel were seen. Large amounts of



1  
FIGURE 1. Miller-Abbott tube through pylorus. Time, two hours. Balloon containing mercury only. 2  
FIGURE 2. Miller-Abbott tube in small intestine. Time, eight hours. Balloon containing 30 cc. of air. 3  
FIGURE 3. Miller-Abbott tube at point of obstruction. Time, thirty-six hours. Balloon containing mercury and 30 cc. of air.

serosanguineous fluid were removed by suction. The most accessible loop of distended intestine was exteriorized through a small left McBurney incision as an enterostomy. The main wound was closed with through-and-through, peritoneum to skin, sutures of heavy silver wire. His immediate

1. Blodgett, J. B.: A Technic for Satisfactory Use of Miller-Abbott Tube. *Am. J. Surg.*, 53:271-279, Aug. 1941.

2. Abbott, W. O.: Indications for Use of Miller-Abbott Tube, *N. England J. M.*, 225:641-646, 23 Oct. 1941.

3. Wilkins, J. A.: Mercury Weighted Stomach Tube, *J.A.M.A.*, 91:395-396, 11 Aug. 1928.

postoperative condition was critical, but release of the obstruction together with supportive measures carried him through this phase. To date (12 April 1945), the enterostomy stoma has gradually decreased in size, but it frequently emits profuse intestinal contents, which excoriate the adjacent skin. His prolonged convalescence has been comparable to our experience prior to the origin of the Miller-Abbott tube.

The dangers in the surgical management of intestinal obstruction stimulated our interest in finding a more rapid technique of intubation. Wangenstein casually mentioned but did not describe the use of mercury as an aid. A member of our surgical service recalled a recent article<sup>4</sup> describing the successful employment of mercury as a weight in the balloon for the purpose of facilitating its passage through the pylorus. We have modified slightly and successfully employed this method in treating twenty-one patients. The average time of intubation beyond the pylorus has decreased from forty-eight hours in the earlier experiments to one to three hours at present. Successful management without radiographic control is attained, although more accurate localization may be so confirmed. Insufflation of the balloon with about 30 cc. of air, accompanied by gentle traction, will, if resistance is encountered, confirm the location of the tube in the duodenum. A description of the technique used in our cases follows. Seventeen patients were not suffering from bowel obstruction. We noted only slightly more difficulty in intubating Chinese patients.

TABLE I

Actual time of duodenal intubation		
Time in hours	Number of cases	Percent
1	7	33.3
2	5	23.8
3	5	23.8
4	1	4.8
5	2	9.5
24	1	4.8

#### Technique of Intubation

1. The balloon must be tested for air capacity and presence of leaks before introduction of the Miller-Abbott tube through either nostril into the stomach.

2. Depending on the amount of gastric contents, lavage or suction is initiated.

3. The patient is placed on his right side and fixed in this position.

4. Three cc. of metallic mercury are injected into the rubber balloon. To make certain that the mercury passes completely through the tube into the balloon, 20 cc. of air are forcibly insufflated subsequently. The air is then suctioned back, because the balloon is still in the stomach and must be deflated to pass through the pylorus.

5. Once this has been done, the drainage lumen is connected to Wangenstein suction and the character of contents noted.

6. Every hour the tube is passed 2 inches, while the patient is encouraged to drink large quantities of water. If he is unable to do so we have passed an additional tube for this purpose.

7. It is important to leave a loop of slack tube at the external nares because spontaneous descent frequently occurs.

8. When the color of the drainage changes to the characteristic yellow-green of duodenal contents and the tube is at the 70-cm. mark, it is presumed that the balloon is at or through the pylorus. In the last ten patients, this has occurred in one to two hours after intubation.

9. At this time, an x-ray film will accurately show the location of the balloon, since the mercury is opaque. In patients who cannot be taken to the x-ray laboratory, or if radiographic confirmation is not available,

4. Harris, F. I.: A New Rapid Method of Intubation with the Miller-Abbott Tube, J.A.M.A., 125:784-785, 15 July 1944.

instillation of 30 cc. of air into the balloon and gentle traction will determine if it is pre- or postpyloric in position.

10. Once the Miller-Abbott tube is in the duodenum, 30 cc. of air are forced into the balloon and farther passage is often spontaneous. If this is not the case, the patient is shown how to pass it farther. The withdrawal of the Miller-Abbott tube containing mercury is no more difficult than otherwise.

#### Summary

This technique has proved to our satisfaction that routine use of intestinal suction for impending or actual bowel obstruction is feasible in a field or evacuation hospital. Radiographic guidance, while helpful, is unnecessary. No fear need be held concerning possible dangers to the patient if the balloon breaks, as mercury is not absorbed from the gastrointestinal tract. This fact has been proved time and again on experimental animals. Withdrawal of the tube is not impeded because of the fluid nature of mercury.

### AN IMPROVISED INCUBATOR HEATING UNIT

SECOND LIEUT. HASKELL S. TUBIASH  
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The bacteriology laboratory of this 750-bed station hospital in the Central Pacific Area is equipped with an incubator (Med. Dept. Item No. 4292328), heated by a Coleman burner, model 526, which generates 5,000 B.T.U. per minute. The heated air rises into a metal hot air duct and enters the incubator through a shutter which is controlled by a thermostat inside the incubator.

The laboratory had been operating only a few days when it became obvious that the heat source was unsatisfactory. The burner not only threw a great deal of unwelcome heat and noise into the laboratory but burned a maximum of only five hours and frequently was in need of repair. Much inoperative time was lost at each filling while the burner was allowed to cool (as a safety precaution) and while the flame was again properly adjusted. Other similarly equipped laboratories were experiencing the same difficulties with this equipment.

When electricity was available, attempts were made to replace the gasoline burner with an electrical heating unit. The burner and hot air duct were removed, and a 100-watt bulb (the largest obtainable) set into a reflector was placed directly under the shutter of the incubator. The light bulb proved to be an inadequate source of heat and was replaced by an infra-red therapeutic lamp (Med. Dept. Item No. 7123400), which generated sufficient heat, but its 600 watts proved to be a serious drain on the line, and the heat from its constant operation burned out porcelain sockets in a matter of days. Difficulty in maintaining the infra-red lamp in operation and frequent delays in electrical service for the hospitals as a whole finally forced abandonment of efforts to heat the incubator electrically.

The problem was satisfactorily solved by obtaining an ordinary lantern (Med. Dept. Item No. 9777500), removing the deflector from the top, and setting the lantern directly under the shutter of the incubator. On a low setting of the wick the lantern produces adequate, dependable, smokeless heat. One filling is sufficient for at least three days' operation, and the lantern can be quickly and safely refueled with no period of cooling, adjustment, or consequent fluctuations of incubator temperature. There is no intricate mechanism to operate or to repair, and neither noise nor appreciable excess heat is produced. Care must be exercised in shutting the incubator door lest a draft be blown back through the shutter which may extinguish the lantern.

## THE PREVENTION OF RECURRENT VINCENT'S INFECTION

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The history of patients with recurrent Vincent's infection usually follows one of two definite patterns. In the first, an acute attack is successfully treated and the patient is well until another attack comes. In the other, the response to treatment of the acute attack is not so successful. While most of the subjective symptoms disappear, the gums remain inflamed and the typical picture of chronic Vincent's is present and periodically flares up and becomes acute. In old cases with several recurrences, often the destruction of the investing tissues is tremendous. Both of these recurrent types are the result of incomplete treatment by the dentist and cause the loss of a large number of man-hours, both of the dentist and the patient.

Since the treatment for the relief of acute Vincent's is generally well understood and effective, this paper concerns the follow-up treatment that is so important and generally neglected. If the procedures to be described are carefully followed, recurrent Vincent's with its destruction of the investing tissues will be held to a minimum. The small role that drugs play in this follow-up treatment must be emphasized. The mouthwash used during the acute stage should be discontinued and no strong caustics used in office treatment. While astringents and antiseptics may be helpful, not much reliance can be placed on them.

As soon as the acute symptoms subside, all sources of irritation to the gingival tissues should be eliminated, overhanging fillings smoothed down with files, and open or malposed contact points closed by properly contoured restorations. A careful prophylaxis should be given, making sure that all bits of subgingival calculus are removed. The patient should then be taught a scientific technique of tooth brushing. If much interproximal tissue has been lost, the interdental stimulator is almost essential for proper massage of this area. Each patient presents a different problem as to his home care, and each patient differs in his ability to learn toothbrush technique. The slightly indifferent or the manually inept patient should be taught an easier method of brushing than the conscientious person who is really interested in oral care.

In the periodontia clinic at Drew Field each patient brings in two properly designed brushes. One is given to the patient after the proper method (Charter's, Stillman's, or rolling) is demonstrated. The second brush, with the patient's name written on the box, is retained until the next visit, when the patient shows how well he has learned the technique. If the brushing is satisfactory, he is given the second brush. If errors are discovered, they are corrected by another demonstration and the brush is held until a satisfactory performance is given. The patient must assume his full share of the responsibility or the dentist's efforts will fail.

Food impactions caused by plunger cusps should have been eliminated during the treatment of the acute stage; but since traumatic occlusion is very often a contributing factor in any periodontal disease, the occlusion should be carefully examined. Almost invariably some equilibration will be found necessary. Common sense must guide this procedure. The vertical dimension should rarely be lessened and a tooth must never be disoccluded. The goal of occlusal equilibration is maximum occlusal contact with equitable distribution of the occlusal forces. Extensive grinding is rarely indicated. Often the bringing into contact of one or two more teeth will be all that is necessary. The general rule for grinding is that it should be done on the buccal cusps of the uppers, the lingual cusps of the lowers, and on the upper anteriors. A definite order of procedure should be followed: centric, protrusive, right and left lateral, and finally a recheck on centric.

The ground portions of the teeth should be carefully shaped and polished.

It is necessary that all periodontal pockets receive prompt treatment. The vast majority of pockets can be eliminated by packing and curettage, although surgical procedures may be used in pockets over 4 mm. Here again the importance of toothbrush stimulation must be stressed. The success of a periodontist is directly proportional to his ability to arouse and maintain in his patients enthusiasm for home care.

After the proper gingival tone has been obtained, attention should be directed to what Box<sup>1</sup> calls the "primary incubation zones." These zones are the sites where the organisms of Vincent's are present in large numbers even in an apparently healthy mouth. Autogenous infection occurs from these areas when the resistance of the patient is lowered. Box lists them in the order of their importance: (1) gingival flaps on lower third molars;

(2) lingual margins of interproximal gingivae of upper centrals associated with deep gingival sulci or periodontal pockets; (3) buccogingival margins of upper second and third molars in crowded contact with the mucous membrane of the cheek; (4) cryptic tonsils.

If any of these areas are present, they must be eradicated if recurrence of the disease is to be prevented. While the second of the foci named will

usually respond to conservative treatment, the others must almost always be surgically removed.

One of the most important and least recognized pathologic conditions occurring after an attack of Vincent's infection is the saucer-shaped interproximal area. There are two varieties of this. The first (figure 1) has normally contoured bone. The second (figure 2) is usually associated with chronic Vincent's and the bony contour is affected. In both types the architecture of the interproximal tissue is seriously changed so that food particles are not deflected during mastication. Food accumulates in the area and the saucer becomes deeper. If the bone is not affected, proper contour can be usually restored by packing and the faithful use of the interdental stimulator. In the second type, surgical intervention is necessary. Often, only the facial rim of the saucer need be removed. In that case there is a slant from lingual to facial after healing has occurred (figure 3). The bone may be removed with a fissure bur or a chisel. A surgical cement covers the cut area for at least a week after the operation. The postoperative treatment, after the pack is removed, consists of zinc chloride packs and interdental stimulation.

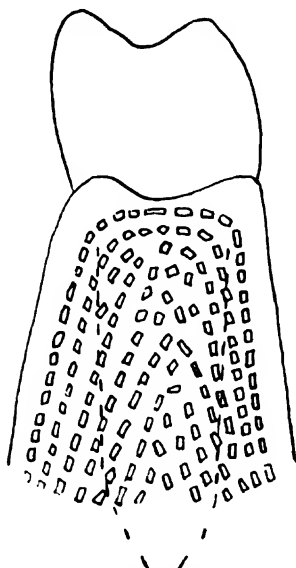


FIGURE 1

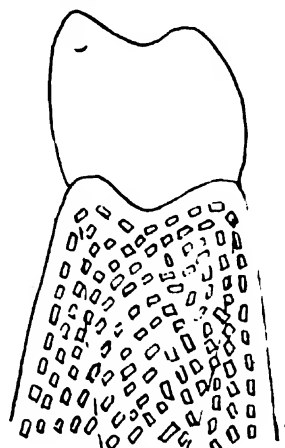


FIGURE 2

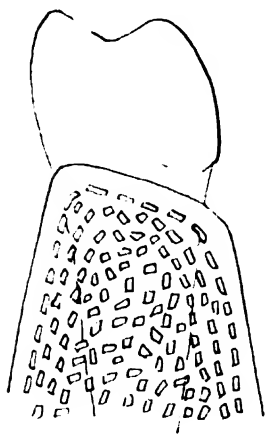


FIGURE 3

1. Box, Harold Keith: Necrotic Gingivitis, Bulletin No. 14, Canadian Dental Research Foundation. Toronto: University of Toronto Press, 1930.

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